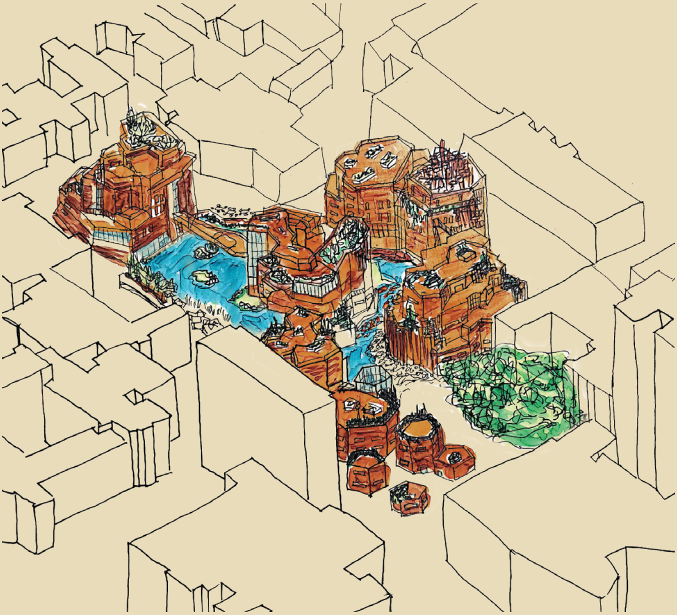

frog *city*

ANURAPOLIS

A LIVING WETLAND LABORATORY

DESIGN THESIS STUDIO 2020
STUDIO 09: INTERSPECIES DESIGN
NICOLE REN

DESIGN THESIS
STUDIO 09: INTERSPECIES DESIGN

SEMESTER 2 2020
Supervisor: Stanislav Roudavski

Faculty of Architecture, Building and Planning
Melbourne School of Design
The University of Melbourne

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Studio 04

Studio 18

Studio 35

Author

I am Nicole Ren, a Malaysian-Chinese born and raised in Hong Kong. I moved to Australia when I was 18 to complete my Bachelor of Environments at the University of Melbourne, where I am also studying the Master of Architecture degree. My previous Master's studios include Studio 04: Crowded House, Studio 18: ExLaB Articulated Matter, and Studio 35: STORE Studio.

This book is a part of my final thesis project on interspecies design that was done during the COVID pandemic lockdown.

Welcome to Anurapolis, I hope you enjoy your visit!

ANURA • POLIS

[uh-**noor**-ra-puh-lis]
noun
1. A city of tailless amphibians

Derived from
Anura
noun
ZOOLOGY
1. an order of tailless amphibians that comprises the frogs and toads.
_ amphibians of the order Anura ; frogs and toads.
plural noun: **anura**

Polis
noun
1. a **city-state**, or **polis**, was the community structure of ancient Greece. Each city-state was organized with an urban center and the surrounding countryside.
plural noun: **poleis**

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[1] Land Water and Planninhg Victoria. Department of Environment, *Growling Grass Frog Habitat Design Standards: Melbourne Strategic Assessment.*, 2017, https://nla.gov.au/nla.obj-2592085609.

ANURAPOLIS:
A Living Wetland Laboratory

As global urbanisation is rapidly eradicating the native wildlife from their homes, humans are quick to eliminate dirt and all nonhuman life from their built environments. They are also aggressively enveloping natural landscapes and major waterbodies with impervious terrain, causing the global frog population to suffering significantly from habitat loss and the Earth's poor environmental condition, as well as a fatally contagious fungus called Chytrid[1].

Anurapolis utilises the existing Hassell brief and the site of University of Melbourne's Union House as a living wetland laboratory that will serve as a pedagogical tool for the Faculty of Life Sciences, a dedicated frog research facility, and a monitored haven for local frogs (and other nonhumans) to begin to replenish their species.

This thesis will examine how designing for nonhumans by reconstructing the pre-existing biome of the site can teach us about the interspecies potential before human intervention and environmental degradation, and spark novel and innovative architectural design and construction. It will also encourage the inclusion of more-than-human communities and promote eco-centric lifestyles for the human users of the site, particularly through exploring the themes of dirt/ cleanliness, darkness/ light, time, and wilderness/ tidiness, to the benefit of nonhumans in the built environment.

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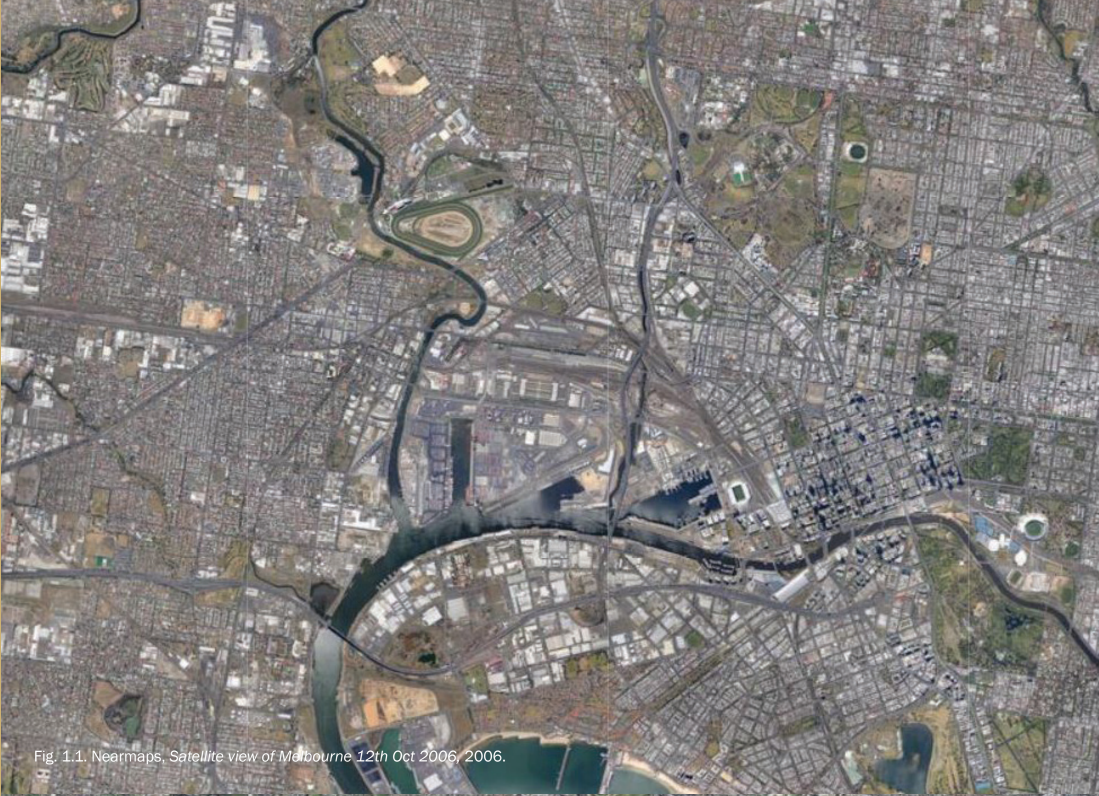


Fig. 1.1. Nearmaps, *Satellite view of Melbourne 12th Oct 2006*, 2006.

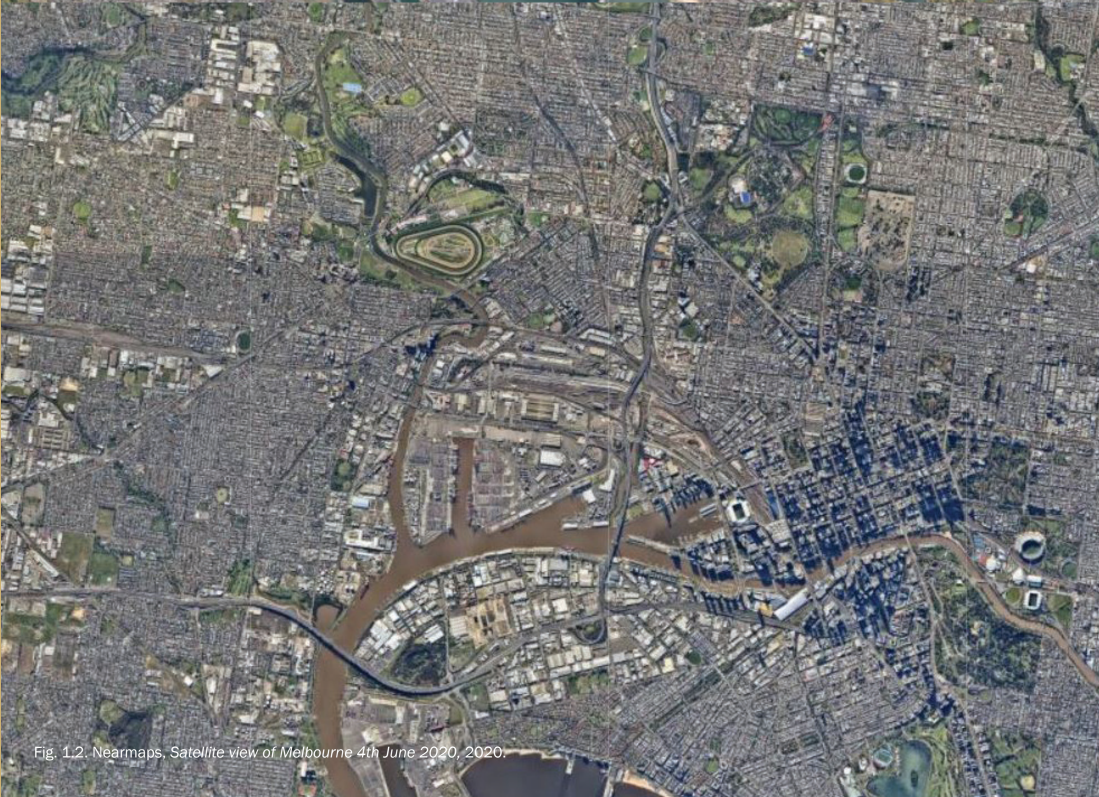


Fig. 1.2. Nearmaps, *Satellite view of Melbourne 4th June 2020*, 2020.

01 SIGNIFICANCE

THE ECOLOGICAL CONTEXT

To comprehend the significance of this thesis project, the ecological, urban, and cultural context will be explored to fully understand the current climate of the nonhuman world.

With urbanization being a common trend globally, it is no wonder that wildlife rapidly disappearing from our landscape is not a new phenomenon. Decades of literature has critiqued and predicted the exponential issues that nature faces against the sprawling dominance of humans. Around the world, the colonization of nature, deforestation and large mining excavations continue to displace thousands and millions of species.[1] Whilst acknowledged through the pressing urgency of climate change in the past century, only recently has introducing more biodiversity in the urban environments risen to the forefront, and designers are only just beginning to take another look at what the future of interspecies cohabitation in dense urban environments could be.

With little realized precedents to follow, designers can only reference idealistic utopias of species cohabitation like Wolch's Zoopolis,[2] but without realistic interventions such worlds will only live in theory. Meanwhile, the demand of cities will continue to cause negative urban impacts on wildlife, such as species loss, atmospheric pollution and the urban heat island effect.[3] These drastic alternations in living conditions plague the unassuming wildlife by driving them from their natural homes or forcing them to adapt to the lives of their human invaders.

Recent solutions to combat biodiversity in cities include green roofs which only help to create green patches within the city, but issues of habitat fragmentation still exist. Designing for humans and nonhumans should ideally be on the forefront of architectural discourse for better environmental and biodiversity design. Architects and designers are in the unique role of being able to act as meditators and install greater interventions in the built world to connect humans and wildlife, and to shift the focus towards our nonhuman counterparts.[4]

Looking closer at the context of today, urbanization is taking over the world (see Figure 1.1 & 1.2).[5] The once soft soil is replaced by impermeable concrete and flowing rivers, polluted. Wildlife are effectively driven from their homes, or left to adapt for survival or die. The increasing threat of near extinction for many species across the world is incredibly concerning and an upset to the earth's natural ecosystem, resulting in the current climate change situation.[6]

1.Rosemary-Claire Collard, Jessica Dempsey, and Juanita Sundberg, "A Manifesto for Abundant Futures," Annals of the Association of American Geographers 105, no. 2 (March 4, 2015): 322–30, https://doi.org/10.1080/00045608.2014.973007.

2. Jennifer Wolch, "Zoöpolis," Capitalism Nature Socialism 7, no. 2 (June 1996): 21–47, https://doi.org/10.1080/10455759609358677.

3. Don Garden, "Phases of Ecological Impact of the European Occupation of Victoria," in Nature Conservation Review (Victoria National Parks Association, 2014); Georgia E. Garrard et al., "Biodiversity Sensitive Urban Design: Biodiversity Sensitive Urban Design," Conservation Letters 11, no. 2 (March 2018): e12411, https://doi.org/10.1111/conl.12411.

4. Stanislav Roudavski, "Notes on More-than-Human Architecture," in Undesign: Critical Practices at the Intersection of Art and Design, ed. Gretchen Coombs, Andrew McNamara, and Gavin Sade (Abingdon: Routledge, 2016), 24–37, https://doi.org/10/czr8.

5. Fred Pearce, "Ecopolis Now: Forget the Rural Idyll – Urban Living May Be the Best Way to Save the Planet," New Scientist, 2006.

6. Pearce, "Ecopolis Now: Forget the Rural Idyll – Urban Living May Be the Best Way to Save the Planet,", 2006.

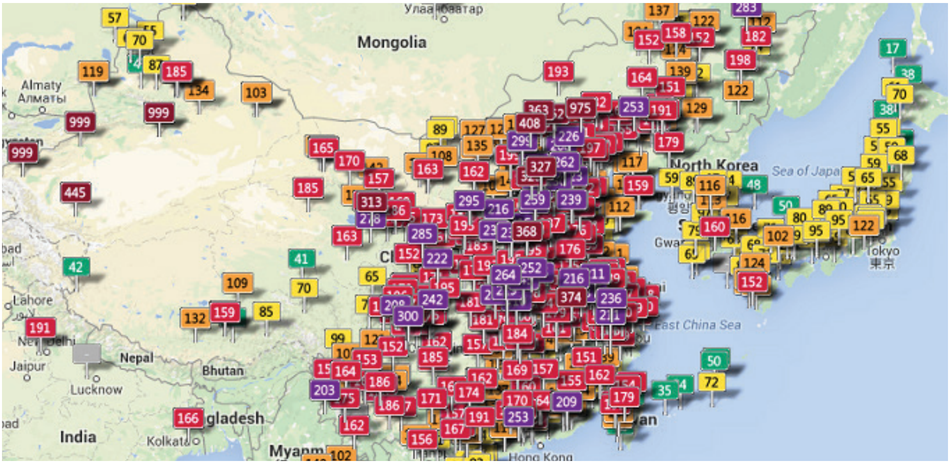


Fig. 2.1. AQICN, *Air Pollution Map of China*, 2015.

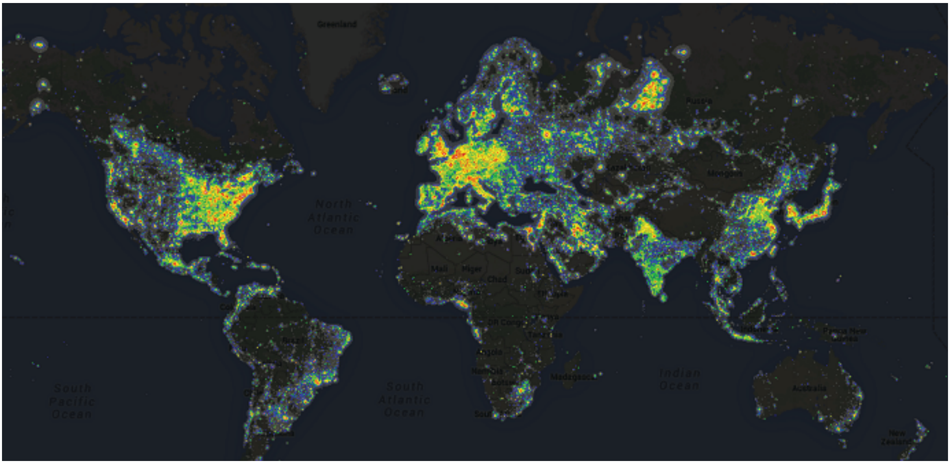


Fig. 2.2. David Lorenz, *Light Pollution Atlas*, 2006.

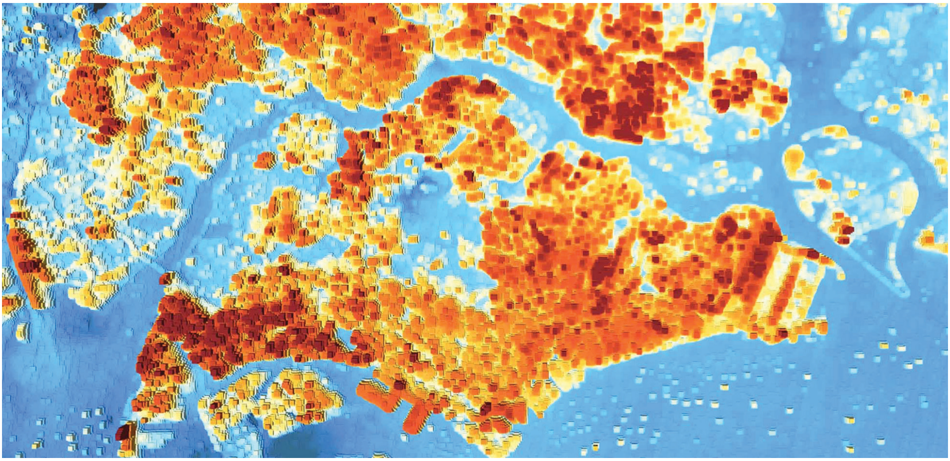


Fig. 2.3. NASA, *Land Surface Temperature Map of Singapore*, 2018.

Of the various urban impacts, an important one to nonhumans is the lack of green corridors for them to travel to and from safely in the hunt for food or a home.[1] Additionally, in the presence of humans, most animals prefer to hunt at night under the cover of the dark, but with significant light pollution it proves difficult.[2]

Another large negative impact is the urban heat island effect that has greatly altered the city's environmental conditions compared to its surrounding rural areas, forcing wildlife to relocate.[3] Despite knowing this, not much has changed in how we build our cities or treat urban nature.

In particular the global frog population has suffered a rapid decline within the last few decades. In part due to a contagious fatal fungus, as well as from significant habitat loss, where large waterbodies such as lakes and rivers, that are essential for their breeding are being pushed underground or filled up to create new land to be developed.[4]

---

1. Garrard et al., "Biodiversity Sensitive Urban Design."
2. Garrard et al.
3. Pearce, "Ecopolis Now: Forget the Rural Idyll – Urban Living May Be the Best Way to Save the Planet."
4. Land Water and Planninhg Victoria. Department of Environment, *Growling Grass Frog Habitat Design Standards: Melbourne Strategic Assessment.*, 2017, https://nla.gov.au/nla.obj-2592085609.

> *"But stories and meanings are not just layered over a pre-existing landscape. Instead, stories emerge from and impact upon the way in which places come to be – the material and the discursive are all mixed up in the making of places..."*
>
> *– Van Dooren & Rose*[1]

---

1. Thom Van Dooren and Deborah Bird Rose, "Storied-Places in a Multispecies City," Humanimalia 3, no. 2 (2012): 1–27.

2. V. A Curtis, "Dirt, Disgust and Disease: A Natural History of Hygiene," Journal of Epidemiology &amp; Community Health 61, no. 8 (August 1, 2007): 660–64, https://doi.org/10.1136/jech.2007.062380.

3. Van Dooren and Rose, "Storied-Places in a Multispecies City", 2.

4. Denis Rose, Damein Bell, and David A. Crook, "Restoring Habitat and Cultural Practice in Australia's Oldest and Largest Traditional Aquaculture System," Reviews in Fish Biology and Fisheries 26, no. 3 (September 2016): 589–600, https://doi.org/10.1007/s11160-016-9426-1.

5. Keith Jacobs, Jeff Malpas, and Wendy Steele, eds., "The City as Wild," in Philosophy and the City: Interdisciplinary and Transcultural Perspectives (London: Rowman & Littlefield, 2019), 43–50.

THE CULTURAL CONTEXT

Contemporary buildings are designed to purposely keep nature and its elements out, whilst its human occupants are quick to remove everything nonhuman and ‘unhygenic’ including natural soil, dust, bacteria etc. Some research has shown that exposure to dirt and uncleanliness helps the human build immunity and tolerance to diseases, as Curtis explains that disgust and aversion to uncleanliness is an innate reaction to avoid diseases [2], however has civilization taken it too far by using harsh cleaning chemicals and impenetrable boundaries around themselves to keep out any form of nonhuman life?

Such blatant physical and chemical boundaries ultimately extinguish any concept of life and harmony. A building that is forever kept sterile and closed to nonhumans is an antithesis to nature and its harmonic ecosystems. Such a construction eliminates the identity of the site on which it is built upon. Van Dooren and Rose explain the need to consider not just the present context of the land, but the past and, perhaps more importantly, the future.[3] So much of the built environment is polished and shined, that many cities are starting to look alike, and are losing their sense of character, history, and stories.

Likewise, the University of Melbourne sits on the land of the Wurundjeri People of the Kulin Nation, who lived in harmony with the land and nonhumans developing a balanced ecosystem before colonization occurred, and their land stripped away from them.[4] Now, as greater awareness is brought upon the history and the Wurundjeri people the project should honor the cultural significance of the land as it is not considered in the current plans of the university.

These stories can be defined as memories. Humans create spatiotemporal associations with the environment through their senses, as do many living beings who use it as a part of their survival. The events that have occurred in one space become time-bound to the individual and forever an intangible layer of the landscape.[5] Thus, it becomes important to question what does the land mean to humans and nonhumans, and what should it mean to them in the future. Time will be an important factor in how the building will change to serve different users over the years.

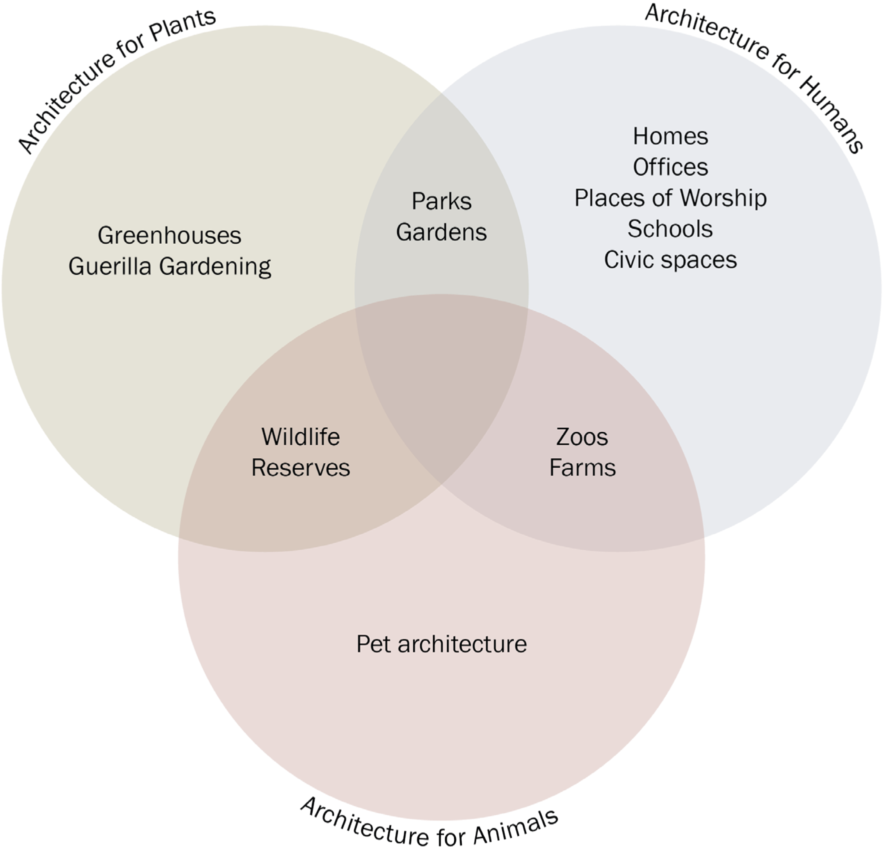


Fig. 1. Nicole Ren, *Interspecies precedents finding the gap venn diagram*, 2020.

02 THE GAP IN KNOWLEDGE

LACK OF NOVELTY

The venn diagram presents a visualisation of the current architectural typologies when designing for plants, humans, and/or animals. It indicates the separations and intersections of design for different living clients.

Should the scope consider all living things, architecture for microscopic forms of life (including bacteria, microbes etc.) is non-existent. Their only man-made homes are in in-vitro tubes and petri dishes. A building that encompasses microscopic lifeforms will become the embodiment of nature in built form. However, due to time constraints this will not be considered within the brief of the project.

LACK OF KNOWLEDGE

Humans are afraid of what they do not understand. As previously mentioned, the aversion to dirt and dust stems from the fear of obtaining diseases. Ideas of dirt and contamination are amplified by social and cultural constructs that through design can begin to break down.

There is a lack of knowledge on what is good interspecies design to draw on to develop future urban cities. For example, water is misused and misplaced in the city. Whilst some countries consider waterbodies as an entity with it's own rights[1], Australia's waterbodies are mistreated and instead are pushed and imprisoned in plastic tubes underground. It is the nonhuman life who suffer the most, with no access to fresh and clean water sources.

LACK OF INNOVATION

There are few successful precedents that included plants, animals and humans as stakeholders. The lack of understanding and empathy for nonhumans, had lead to minimal successful interspecies designs at urban, building, or small scale. Future urban cities must begin to find a way to build more-than-human communities which will lead to more innovative and nonhuman inclusion.

---

1. Hutchison Abigail, "The Whanganui River as a Legal Person," Alternative Law Journal 39, no. 3 (2014): 179–82.

The gap in knowledge presents the possibility to experiment and design novel and innovative interspecies architecture that will deepen the shallow pool of interspecies design knowledge. It will also allow designed investigations into human and nonhuman interactions throughout the building's lifecycle to determine the success of solutions implemented, as well as the potential in reconstructing the past ecological history of the site to not only restore its history and stories, but to also rebuild a better relationship with the nonhuman world, and learn to support them as well.

It will be a chance to involve nonhuman stakeholders within the design as clients and collaborators. To potentially create a living building where observation in the form of natural history, ethology, and more-than-human ethnography, are the main methods of research occuring there. With the wildlife being able to roam freely whilst the 'natural' environment is subject to change, observing their behaviours and needs will prove invaluable to future interspecies design. It will also allow observation and experimentation on the human users of the site, to investigate how dirt and alternate life can be reintroduced to our indoor lives.

Such an opportunity is what leads to the thesis question and hypothesis.

03 OPPORTUNITY

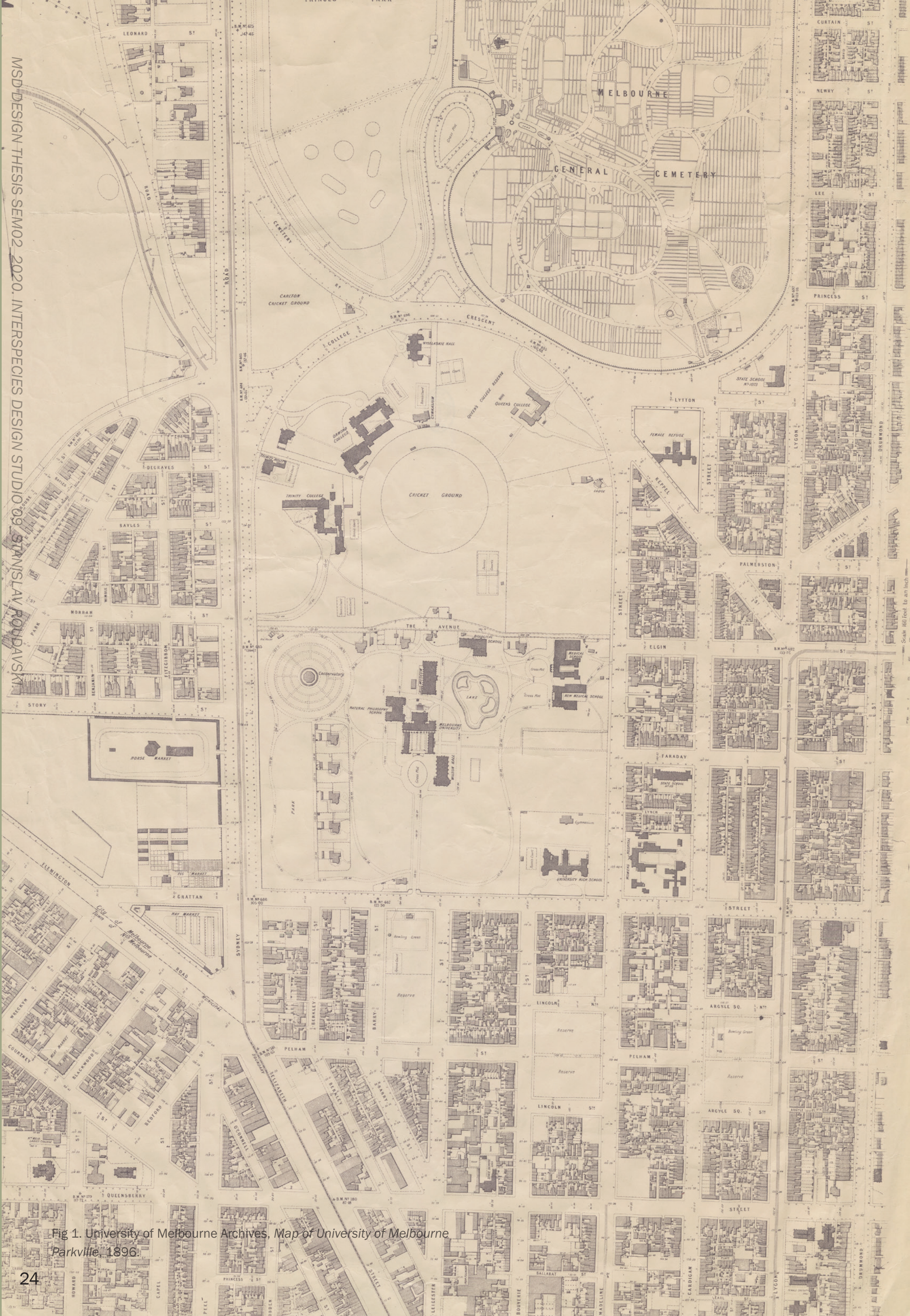


Fig 1. University of Melbourne Archives, *Map of University of Melbourne Parkville*, 1896.

THESIS QUESTION

How can reconstructing the pre-existing biome of the urban environment teach us about the interspecies potential before human intervention and environmental degradation?

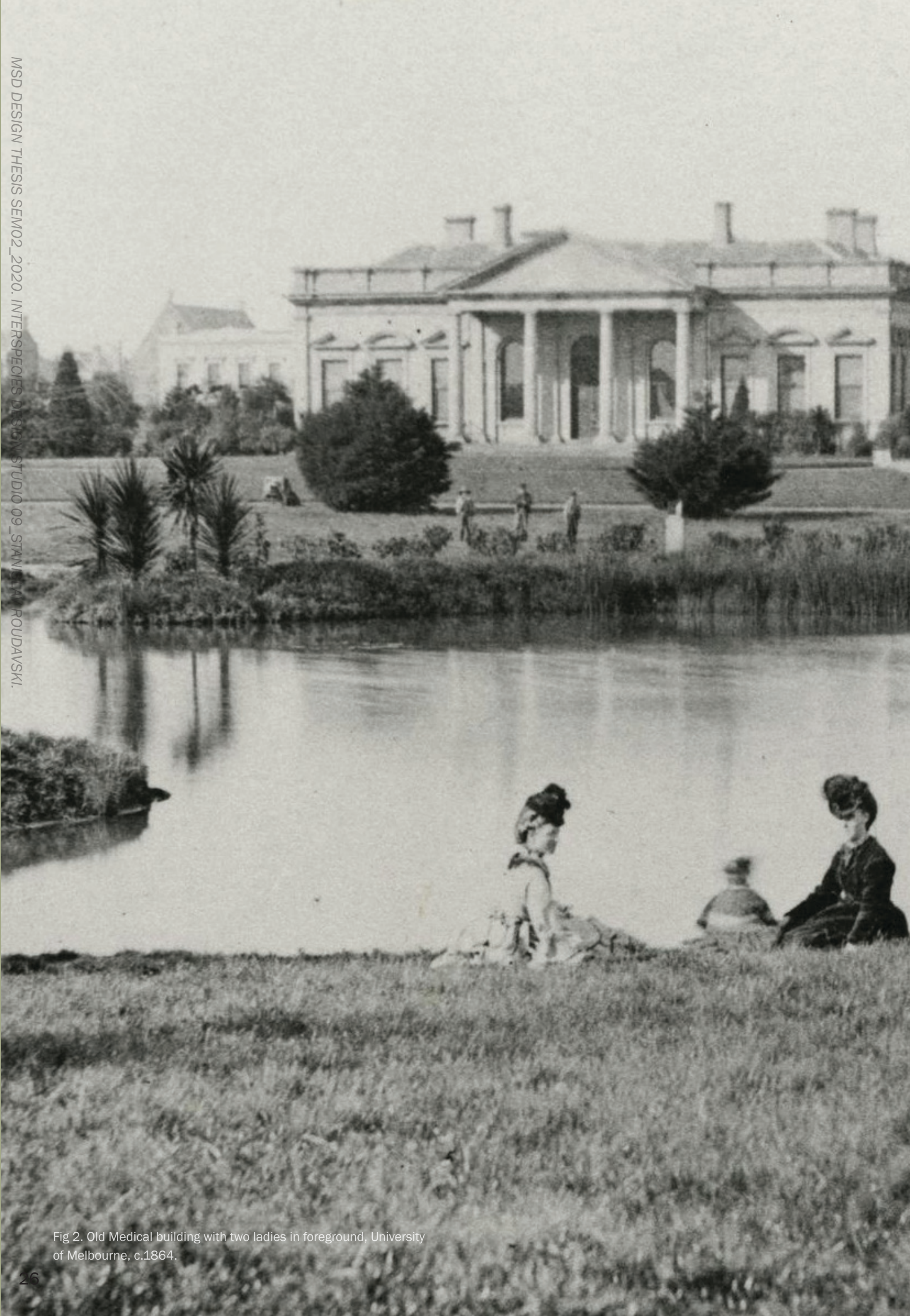


Fig 2. Old Medical building with two ladies in foreground, University of Melbourne, c.1864.

HYPOTHESIS

Designing for nonhumans by reconstructing the natural biome and terrain of the environment will spark novel and innovative architectural design and construction. It will also encourage the inclusion of more-than-human communities and promote eco-centric life-styles for the human users of the site, particularly through exploring the themes of dirt/ cleanliness, darkness/light, time, and wilderness/ tidiness to ultimately benefit the lives of nonhumans in the built environment.

1. OBTAIN AND ANALYSE AN EXISTING SITE

In order to reconstruct the existing biome of the site, a historical and ecological analysis should occur to establish the current nonhuman situation. It will help better understand what resources or wildlife thrived in the natural terrain, and to design in consideration to them.

A comprehensive data collection with visual charts will help better understand the ecological make-up of the site.

2. ANALYSE PRECDENTS

Further research should occur on precedents to observe how existing solutions have helped or hindered the nonhumans. What features or considerations can be implemented into the design?

3. USE AN EXISTING BRIEF (PROVIDED BY HASSELL)

There is no necessity to reinvent the wheel. The existing brief will be the designated benchmark to which to compare the final brief and design outcome to. Its aspirations will be added and edited to align with the conceptual direction of this thesis:

_designing for and with nonhumans
_designing more-than-human communities
_integrating pedgogical tools in the building with the functional programs of the brief

04 METHODS

4. SELECT NONHUMAN & DEVELOP PERSONAS

Personas are created to represent specific user groups of the site and to provide the perspective of someone other than the designer.[1] The impacts of the briefs on these personas can also be compared to determine if there is an improvement in their quality of life.

5. DESIGN OPPORTUNITIES TO TEST

As a large amount of knowledge on interspecies design is unknown on how to include nonhumans within the built environment, this is an opportunity to test the potentials of novel design and construction solutions for the benefit of future built urban projects.

6. DESIGN AT 3 SCALES

Scenarios at large, medium and small scale will help judge the success of the building design as they are used by the different personas over time. They should form opportunities to create innovative features throughout the site.

Furthermore, how time (of day/month/year) impacts these three scales should be considered.

---

1. Lene Nielsen, Personas: User Focused Design, 2019. .

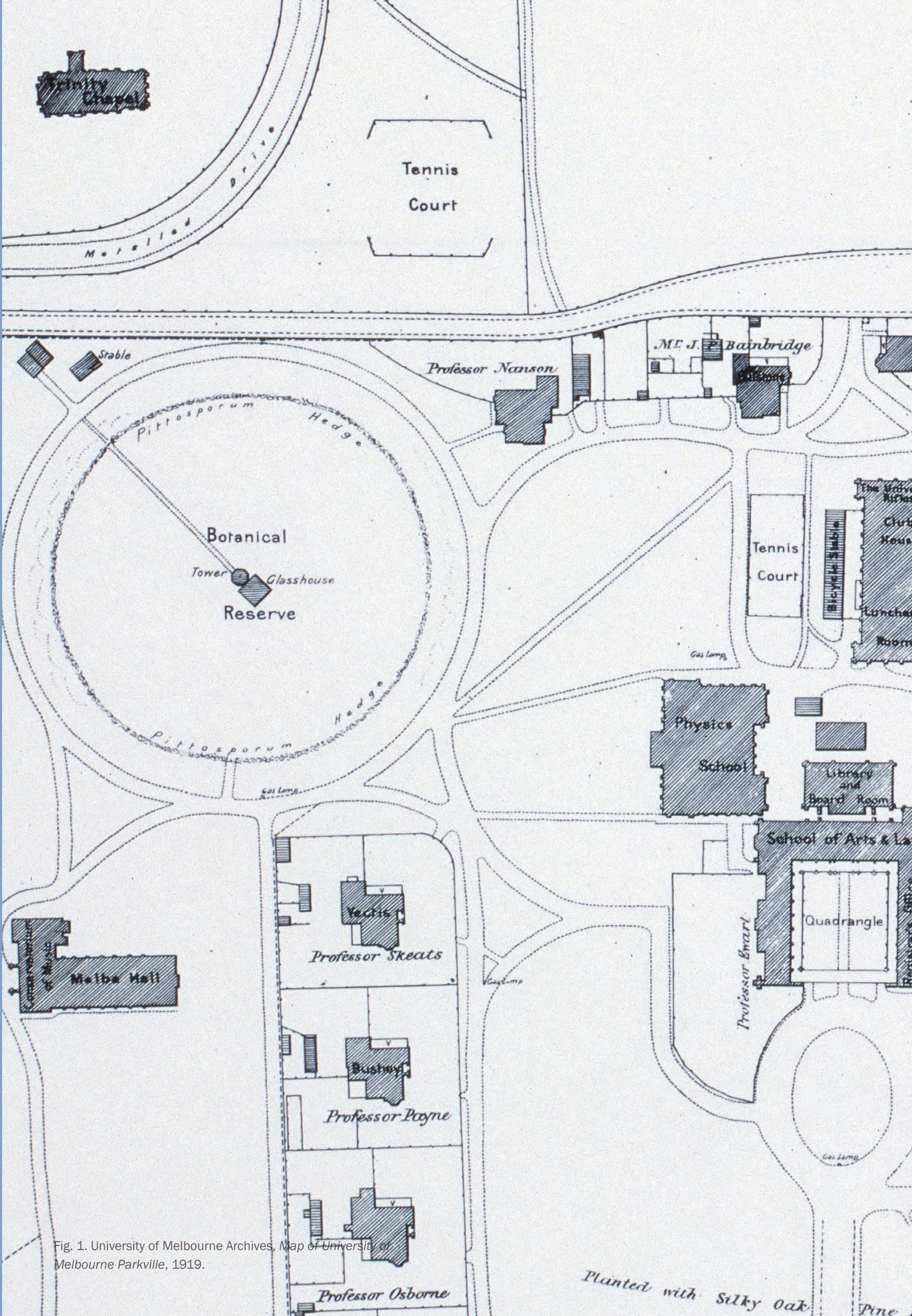
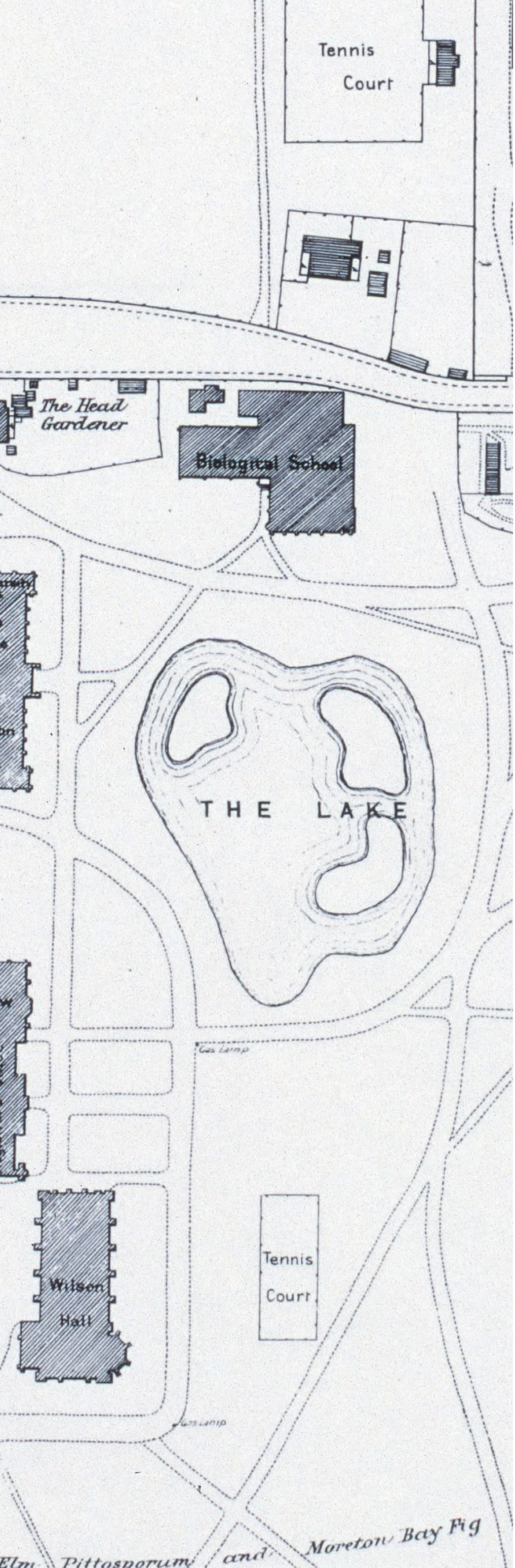


Fig. 1. University of Melbourne Archives, *Map of University of Melbourne Parkville*, 1919.



05 RESULTS

1 THE EXISTING SITE

The University of Melbourne has occupied its Parkville site for 167 years, since 1853.[1] Over the years it has also expanded well past its initial boundaries and has additional campuses around Melbourne, Victoria.

A distinguishing feature of the campus was its expansive lake that flowed from the Bouverie Creek. Many old photographs of the university buildings were taken over this lake, and future buildings were oriented to inward to face it.[2]

---

[1] University of Melbourne, “About Us”, University Of Melbourne, accessed 27 August 2020, https://about.unimelb.edu.au/facts-and-figures.

[2] University of Melbourne Archives, “Key 13: Grounds And Buildings”, University Of Melbourne Archives, accessed 27 August 2020, https://archives.unimelb.edu.au/resources/keys-to-the-past/keys/key-13.

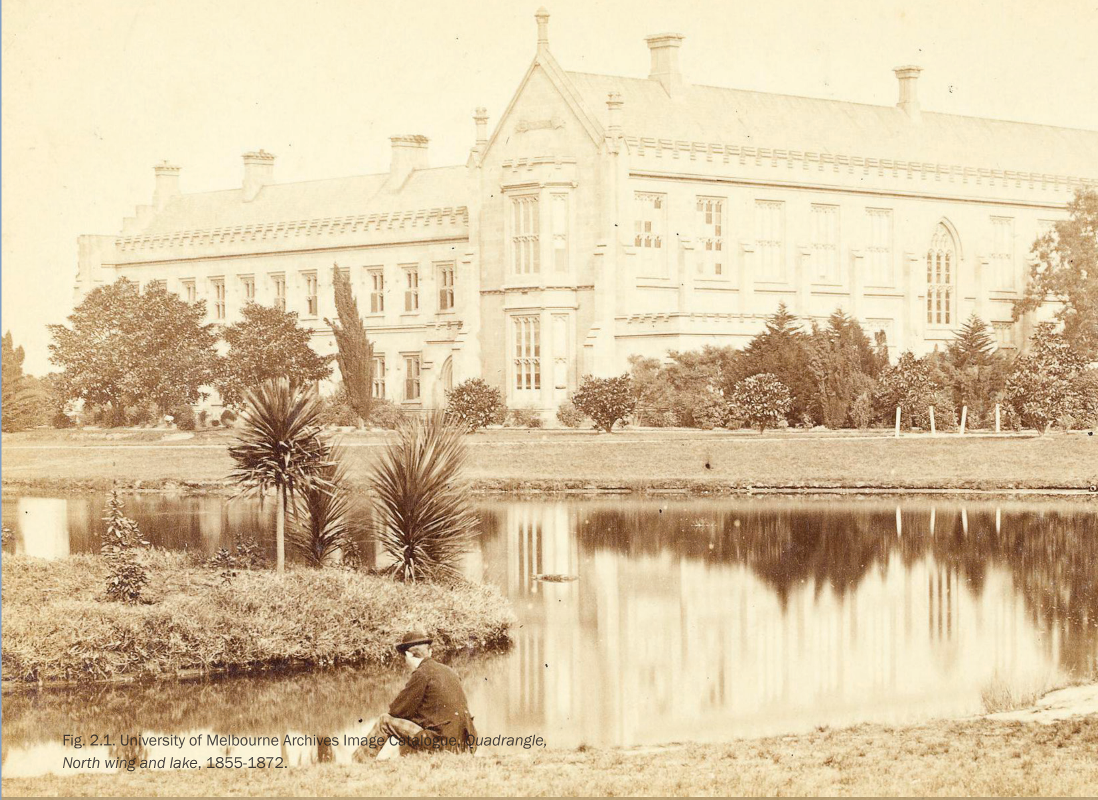


Fig. 2.1. University of Melbourne Archives Image Catalogue, *Quadrangle, North wing and lake*, 1855-1872.

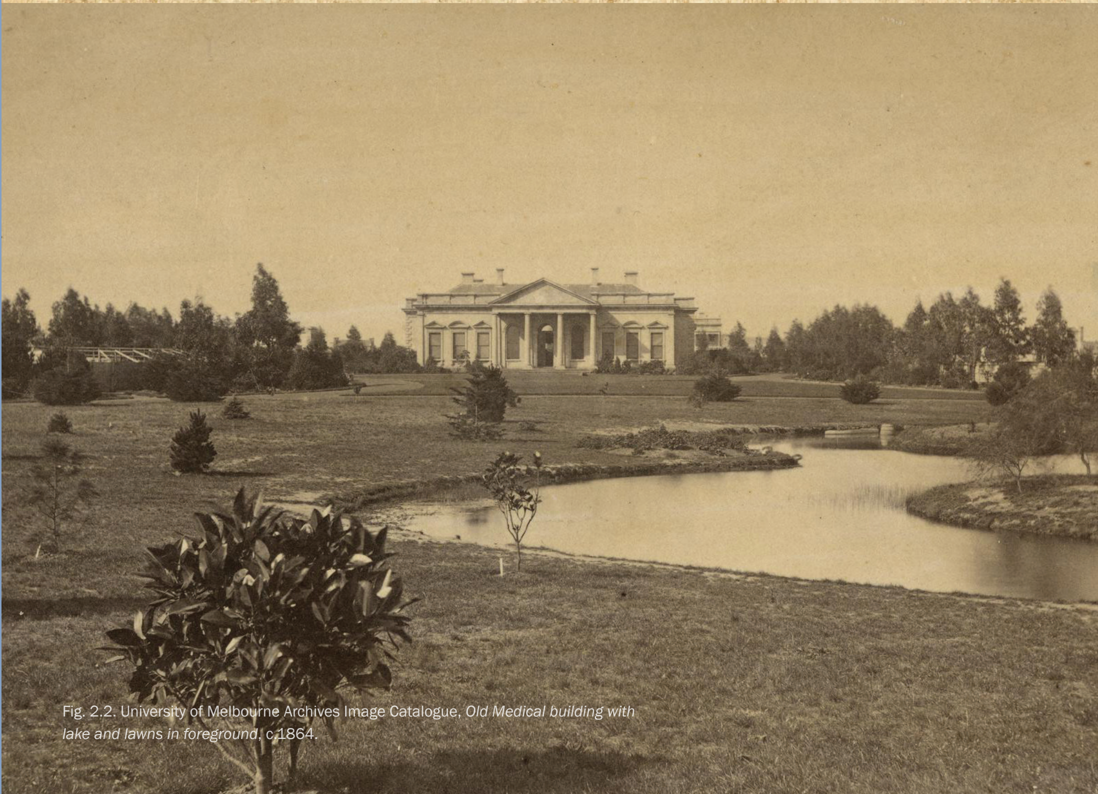


Fig. 2.2. University of Melbourne Archives Image Catalogue, *Old Medical building with lake and lawns in foreground*, c.1864.

The University of Melbourne's old lake used to house native flora and fauna and was a fundamental source of freshwater, food, and life.

Old photos of the lake show its picturesque nature and are a testament to the history of the Wunjederi people who used this lake as a food source to capture eels or harvest vegetation.[3] The lake was filled in the late 1930s for the new Chemistry building,[4] which begs the question of 'what happened to the wildlife that relied on the lake?', and 'can they be brought back to what once was their land?'

---

[3] University of Melbourne Archives, "Key 13: Grounds And Buildings".

[4] University of Melbourne Archives.

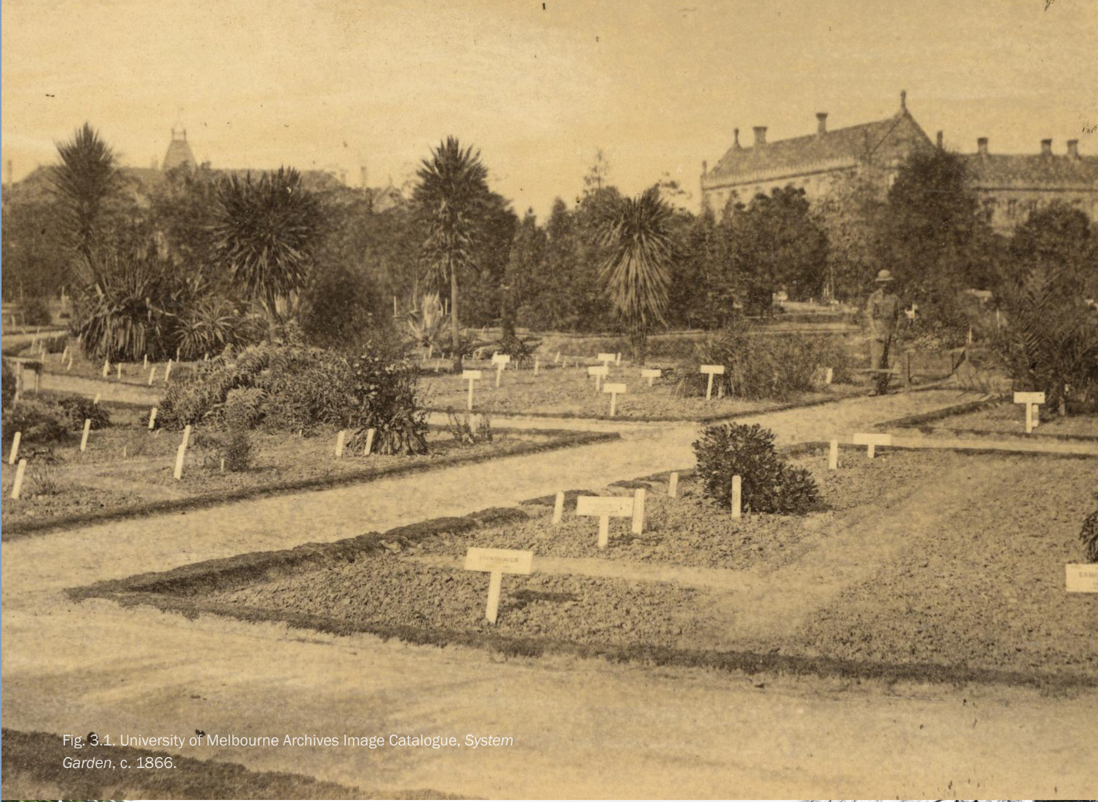


Fig. 3.1. University of Melbourne Archives Image Catalogue, *System Garden*, c. 1866.

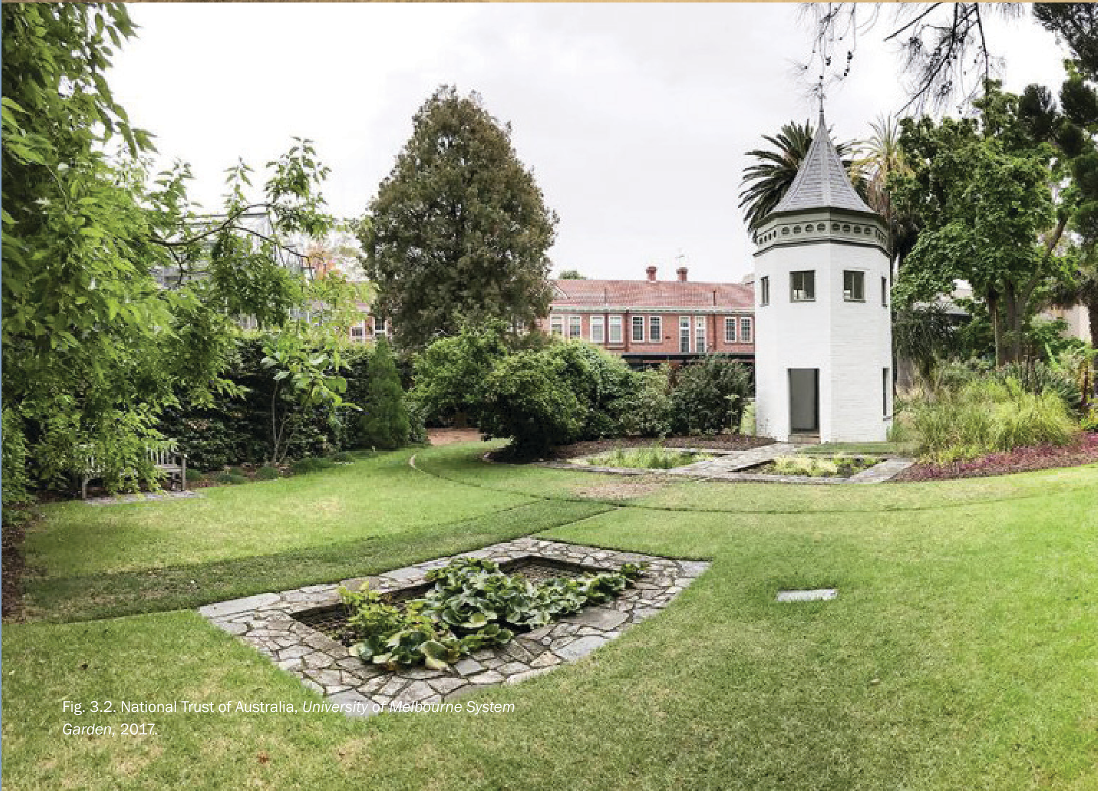


Fig. 3.2. National Trust of Australia, *University of Melbourne System Garden*, 2017.

Similar to the proposed thesis, the university's System Garden was conceived as a living herbarium for the university's faculty of Natural Science, which was also supplemented by a collection of dried specimens and made for a "gigantic teaching aid", and so the living herbarium still remains but at a diminished capacity.[5]

The space is open to the public and is used often by students. The enclosed nature of the space by tall buildings gives a feeling of privacy and peace.

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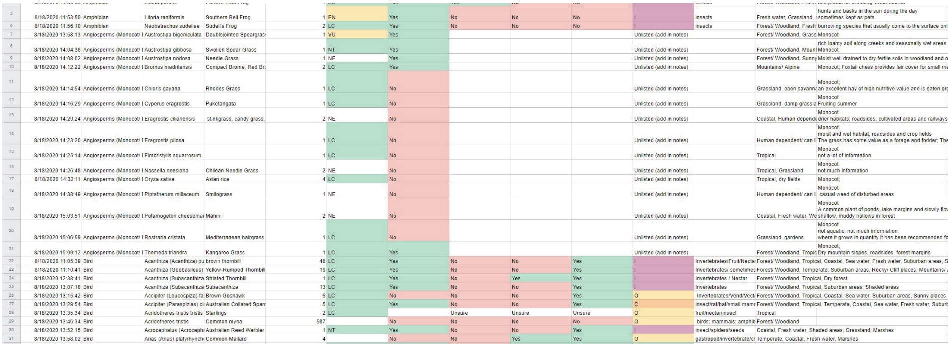
[5] University of Melbourne Archives, "Key 10: Professor Frederick Mccoy, The National Museum 1856 And The System Garden 1861", University Of Melbourne Archives, 2020, https://archives.unimelb.edu.au/resources/keys-to-the-past/keys/key-10.



5	8/18/2020 11:53:50	Amphibian	Litoria raniformis	Southern Bell Frog	1	EN	Yes	No	No	No	I	insects	Fresh water, Grassland, (	hunts and basks in the sun during the day sometimes kept as pets
6	8/18/2020 11:56:10	Amphibian	Neobatrachus sudellae	Sudell's Frog	2	LC	Yes	No	No	No	I	insects	Forest/ Woodland, Fresh	burrowing species that usually come to the surface onl
7	8/18/2020 13:58:13	Angiosperms (Monocot/ I	Austrostipa bigeniculata	Doublejointed Speargras:	1	VU	Yes				Unlisted (add in notes)		Forest/ Woodland, Grass	Monocot
8	8/18/2020 14:04:38	Angiosperms (Monocot/ I	Austrostipa gibbosa	Swollen Spear-Grass	1	NT	Yes				Unlisted (add in notes)		Forest/ Woodland, Mount	rich loamy soil along creeks and seasonally wet areas Monocot
9	8/18/2020 14:08:02	Angiosperms (Monocot/ I	Austrostipa nodosa	Needle Grass	1	NE	Yes				Unlisted (add in notes)		Forest/ Woodland, Sunny	Moist well drained to dry fertile soils in woodland and o
10	8/18/2020 14:12:22	Angiosperms (Monocot/ I	Bromus madritensis	Compact Brome, Red Br	2	LC	Yes				Unlisted (add in notes)		Mountains/ Alpine	Monocot; Foxtail chess provides fair cover for small ma
11	8/18/2020 14:14:54	Angiosperms (Monocot/ I	Chloris gayana	Rhodes Grass	1	LC	No				Unlisted (add in notes)		Grassland, open savanna	Monocot; an excellent hay of high nutritive value and is eaten gre
12	8/18/2020 14:16:29	Angiosperms (Monocot/ I	Cyperus eragrostis	Puketangata	1	LC	No				Unlisted (add in notes)		Grassland, damp grassla	Monocot Fruiting summer
13	8/18/2020 14:20:24	Angiosperms (Monocot/ I	Eragrostis cilianensis	stinkgrass, candy grass,	2	NE	No				Unlisted (add in notes)		Coastal, Human depende	Monocot drier habitats; roadsides, cultivated areas and railways
14	8/18/2020 14:23:20	Angiosperms (Monocot/ I	Eragrostis pilosa		1	LC	No				Unlisted (add in notes)		Human dependent/ can li	Monocot moist and wet habitat, roadsides and crop fields The grass has some value as a forage and fodder; The
15	8/18/2020 14:25:14	Angiosperms (Monocot/ I	Fimbristylis squarrosum		1	LC	No				Unlisted (add in notes)		Tropical	Monocot not a lot of information
16	8/18/2020 14:26:48	Angiosperms (Monocot/ I	Nassella neesiana	Chilean Needle Grass	2	NE	No				Unlisted (add in notes)		Tropical, Grassland	Monocot not much information
17	8/18/2020 14:32:11	Angiosperms (Monocot/ I	Oryza sativa	Asian rice	4	LC	No				Unlisted (add in notes)		Tropical, dry fields	Monocot;
18	8/18/2020 14:38:49	Angiosperms (Monocot/ I	Piptatherum miliaceum	Smilograss	1	NE	No				Unlisted (add in notes)		Human dependent/ can li	Monocot casual weed of disturbed areas
19	8/18/2020 15:03:51	Angiosperms (Monocot/ I	Potamogeton cheesemar	Mānihi	2	NE	No				Unlisted (add in notes)		Coastal, Fresh water, We	Monocot A common plant of ponds, lake margins and slowly flo shallow, muddy hollows in forest
20	8/18/2020 15:06:59	Angiosperms (Monocot/ I	Rostraria cristata	Mediterranean hairgrass	1	LC	No				Unlisted (add in notes)		Grassland, gardens	Monocot not aquatic; not much information where it grows in quantity it has been recommended fo
21	8/18/2020 15:09:12	Angiosperms (Monocot/ I	Themeda triandra	Kangaroo Grass	1	LC	Yes				Unlisted (add in notes)		Forest/ Woodland, Tropic	Monocot; Dry mountain slopes, roadsides, forest margins
22	8/18/2020 11:05:39	Bird	Acanthiza (Acanthiza) pu	brown thornbill	48	LC	Yes	No	No	Yes	I	Invertebrates/Fruit/Necta	Forest/ Woodland, Tropical, Coastal, Sea water, Fresh water, Suburban areas, S	
23	8/18/2020 11:10:41	Bird	Acanthiza (Geobasileus)	Yellow-Rumped Thornbill	19	LC	Yes	No	No	Yes	I	Invertebrates/ sometimes	Forest/ Woodland, Temperate, Suburban areas, Rocky/ Cliff places, Mountains/	
24	8/18/2020 12:38:41	Bird	Acanthiza (Subacanthiza	Striated Thornbill	1	LC	Yes	No	Yes	Yes	I	Invertebrates / Nectar	Forest/ Woodland, Tropical, Dry forest	
25	8/18/2020 13:07:18	Bird	Acanthiza (Subacanthiza	Subacanthiza	13	LC	Yes	No	No	Yes	I	Invertebrates	Forest/ Woodland, Tropical, Suburban areas, Shaded areas	
26	8/18/2020 13:15:42	Bird	Accipiter (Leucospiza) fa	Brown Goshawk	5	LC	No	No	No	Yes	O	Invertebrates/Vend/Vect/	Forest/ Woodland, Tropical, Coastal, Sea water, Suburban areas, Sunny places	
27	8/18/2020 13:29:54	Bird	Accipiter (Paraspizias) ci	Australian Collared Sparr	5	LC	Yes	No	No	Yes	C	insect/rat/bat/small mamr	Forest/ Woodland, Tropical, Temperate, Coastal, Sea water, Fresh water, Suburt	
28	8/18/2020 13:35:34	Bird	Acridotheres tristis tristis	Starlings	2	LC		Unsure	Unsure	Unsure	O	fruit/nectar/insect	Tropical	
29	8/18/2020 13:46:34	Bird	Acridotheres tristis	Common myna	587		No	No	No	No	O	birds; mammals; amphib	Forest/ Woodland	
30	8/18/2020 13:52:15	Bird	Acrocephalus (Acrocephi	Australian Reed Warbler	1	NT	Yes	No	No	Yes	I	insect/spiders/seeds	Coastal, Fresh water, Shaded areas, Grassland, Marshes	
31	8/18/2020 13:58:02	Bird	Anas (Anas) platyrhynch	Common Mallard	4		No	No	Yes	Yes	O	gastropod/invertebrate/cr	Temperate, Coastal, Fresh water, Marshes	

Fig. 4.1. Nicole Ren, *Unimelb nonhuman database*, 2020.

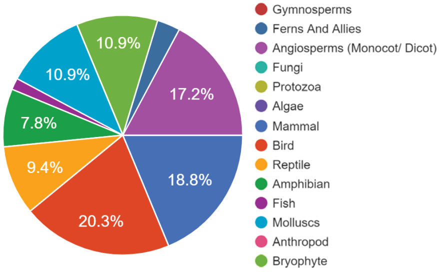


Fig. 4.2. Nicole Ren, *Species group pie chart*, 2020.

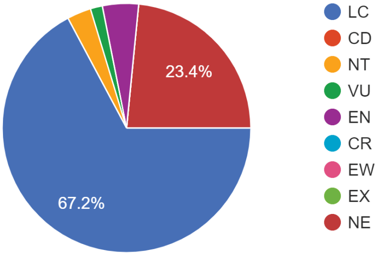


Fig. 4.3. Nicole Ren, *Conservation status pie chart*, 2020.

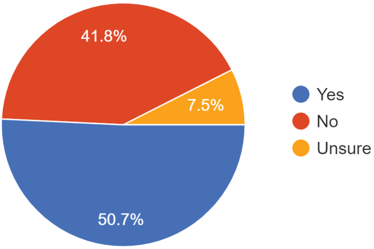


Fig. 4.4. Nicole Ren, *Species endemicity pie chart*, 2020.

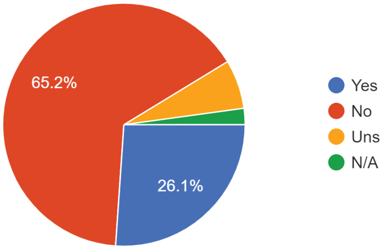


Fig. 4.5. Nicole Ren, *Nocturnal species pie chart*, 2020.

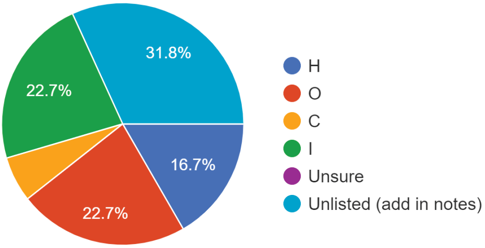


Fig. 4.6. Nicole Ren, *Species diet pie chart*, 2020.

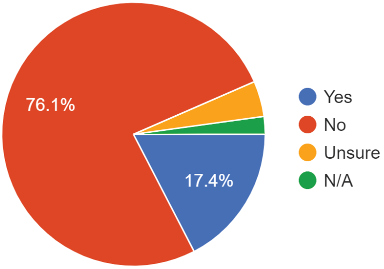


Fig. 4.7. Nicole Ren, *Hibernating species pie chart*, 2020.

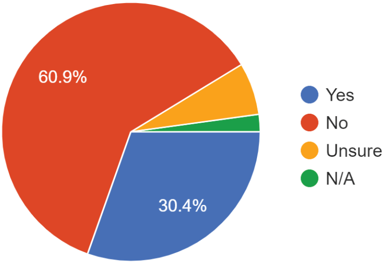


Fig. 4.8. Nicole Ren, *Migrating species pie chart*, 2020.

UNDERSTANDING THE SITE'S ECOLOGY

To understand the current ecology, (pre-) existing ecosystems of the site, and the nonhumans that inhabit the space, a database was created based on information found on Atlas of Living Australia. Information pertaining their species characteristics such as: conservation status, endemicity, diet, noctural/diurnal, hibernation, and migration were obtained to link species together, as well as painting an initial picture of the wildlife and their activity on campus.

2 ANALYSE PRECEDENT

PERTH CULTURAL CENTRE URBAN WETLANDS

Completion: 2010
Architect: Josh Byrne & Associates

In a precedent related to the biome of frogs, this is successful precedent meaningfully integrated the natural system into the built environment and received positive community feedback, and saw a significant increase in numbers and types of species observed there.

The urban wetlands were created to replace the cultural centre's previously large and heavily chlorinated water feature. It was an innovative project led by the State's Metropolitan Redevelopment Authority (MRA) to integrate a sustainable place making landscape.[1]

Features of the project includes a community garden atop the Roe Street Car Park. A small waterfall helps circulate the water and Pygmy Perch fish also inhabit the wetlands to prevent mosquito breeding. A decade later, the urban wetlands has received positive community responses and scientists have observed a greater number and types of species populating the flora there.[2]

The wetlands is an important part of the stormwater management for the urban landscape, it slows the flow of stormwater and filters it through its vegetation before entering the city's stormwater system and Swan River.

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1. Tim Beatley, "Biophilic Cities Journal," A Global Journal of Innovation in Urban Nature, 2, no. 1 (2018): 42–43.

2. Biophilic Cities Project, Urban Wetland, Perth, Western Australia, video, 2017, https://www.youtube.com/watch?v=LGJhcMdQyY8.

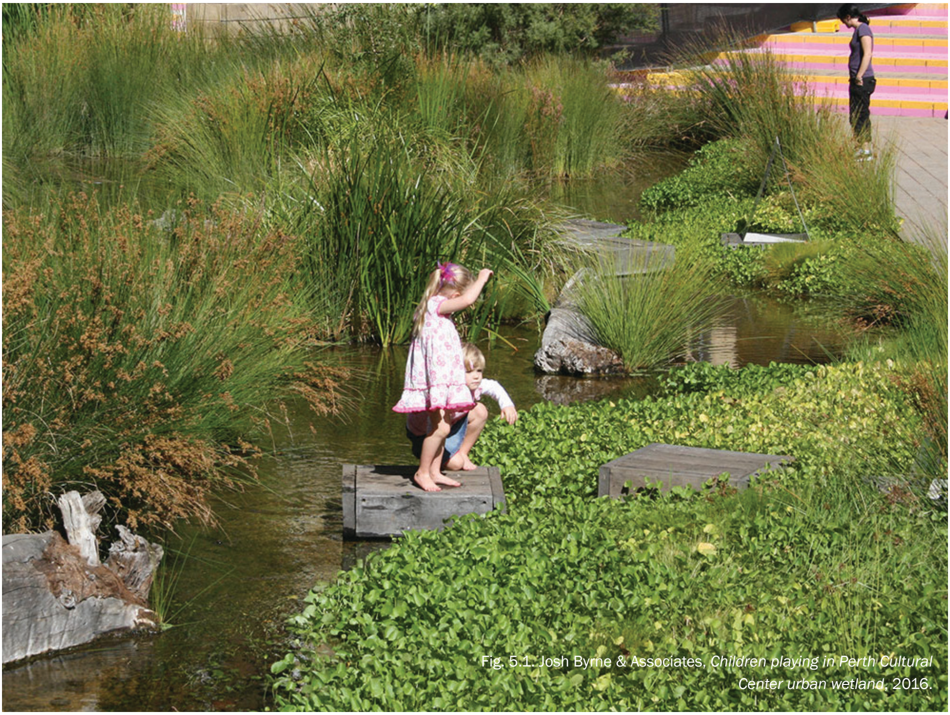

Fig. 5.1. Josh Byrne & Associates, *Children playing in Perth Cultural Center urban wetland*, 2016.

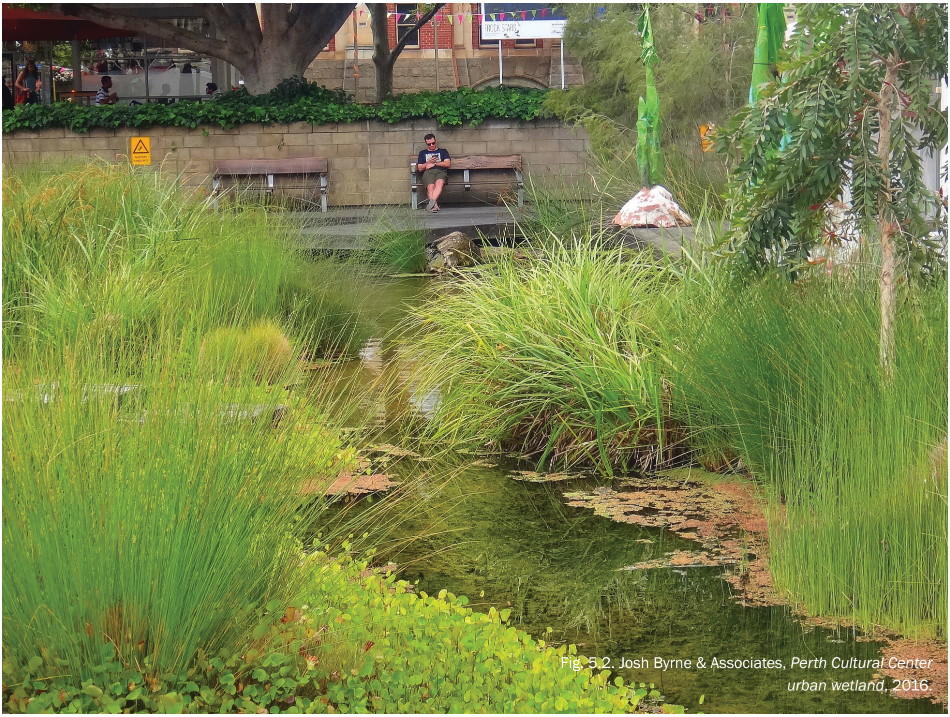

Fig. 5.2. Josh Byrne & Associates, *Perth Cultural Center urban wetland*, 2016.

LABORATORY PRECEDENTS

Existing laboratory precedents are uninspiring and they do not have a large mixture of education and research facilities. The similar programs are simply stacked and clustered together, so there is no interaction visual or physical between them. Apart from Flinders University (Figure 5.5), informal and public spaces are not common throughout the building, thus are not very inviting for the public or for informal conversations and collaboration potentials.

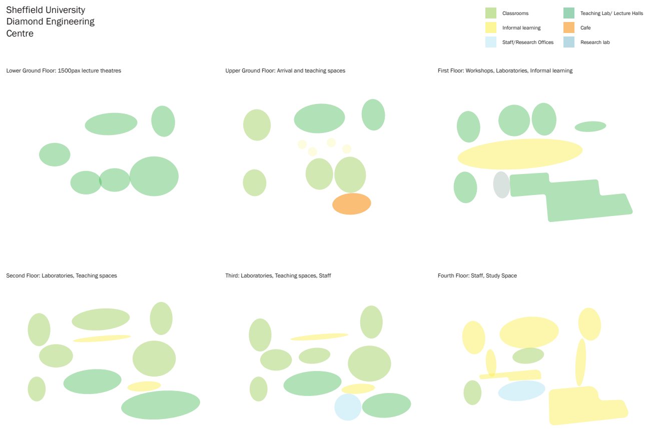
Sheffield University
Diamond Engineering
Centre
Classrooms
Teaching Lab/ Lecture Halls
Informal learning
Cafe
Staff/Research Offices
Research lab
Lower Ground Floor: 1500pax lecture theatres
Upper Ground Floor: Arrival and teaching spaces
First Floor: Workshops, Laboratories, Informal learning
Second Floor: Laboratories, Teaching spaces
Third: Laboratories, Teaching spaces, Staff
Fourth Floor: Staff, Study Space

Fig. 5.3. Nicole Ren, *Program massing of Sheffield University*, 2020.

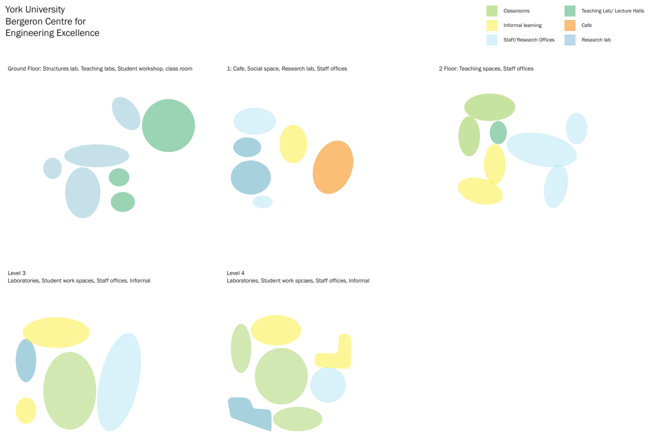
York University
Bergeron Centre for
Engineering Excellence
Classrooms
Teaching Lab/ Lecture Halls
Informal learning
Cafe
Staff/Research Offices
Research lab
Ground Floor: Structures lab, Teaching labs, Student workshop, class room
1: Cafe, Social space, Research lab, Staff offices
2 Floor: Teaching spaces, Staff offices
Level 3
Laboratories, Student work spaces, Staff offices, Informal
Level 4
Laboratories, Student work spcaes, Staff offices, Informal

Fig. 5.4. Nicole Ren, *Program massing of York University*, 2020.

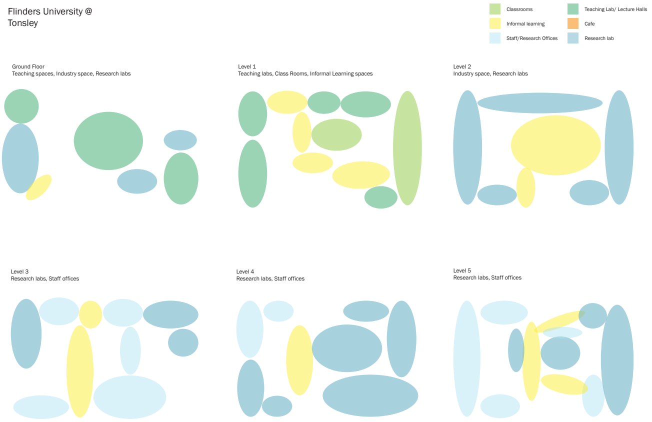
Flinders University @
Tonsley
Classrooms
Teaching Lab/ Lecture Halls
Informal learning
Cafe
Staff/Research Offices
Research lab
Ground Floor
Teaching spaces, Industry space, Research labs
Level 1
Teaching labs, Class Rooms, Informal Learning spaces
Level 2
Industry space, Research labs
Level 3
Research labs, Staff offices
Level 4
Research labs, Staff offices
Level 5
Research labs, Staff offices

Fig. 5.5. Nicole Ren, *Program massing of Flinders University*, 2020.

3 THE EXISTING BRIEF

THE HASSELL BRIEF

The initial brief from Hassell had aspirations that neglected the nonhumans and so a return brief is create to ensure nonhuman inclusion.

01 BRING TOGETHER

Bring together researchers to create a new home for Life Science research at Melbourne

Research staff are currently dispersed across at least 10 different buildings. This precinct would support collocation by creating a home for non-clinical life science, facilitating operational efficiencies.

02 COLLABORATION

Create a highly collaborative environment to grow a culture of interdisciplinary and convergent research at Melbourne with a focus on the Life Science while maintaining disciplinary depth

The existing physical separation entrenches silos, whereas a shared precinct that has been designed to support interaction would foster interdisciplinary and multidisciplinary research and offer research platforms that support convergent research.

THE RETURN BRIEF

BRING TOGETHER 01

Bring together researchers and nonhumans to make the building the perfect case study for Life Science research

The building becomes an observational laboratory for scientists and students to learn more about the wildlife that resides on campus.

Bring together nonhumans through providing green corridors linking green spaces

Nonhumans' habitats are fragmented within the city, this project should aim to connect them physically to each other.

COLLABORATION 02

Encourage collaboration between nonhumans and humans to improve the biodiversity of the site

Working to better understand the wildlife will be useful in supporting the future of the campus' ecosystem.

Collaborative caring of the nonhumans between faculties

Different faculties such as ABPL or the Natural Sciences, can also experiment with innovative ways to help urban wildlife thrive.

THE
HASSELL BRIEF

03 A SENSE OF BELONGING/ PLACE

Manifest a sense of place and purpose

A building that expresses its purpose without relying on signage, provides a sense of place and history, provides great learning spaces and experiences, acts as a centrepiece for the STEMM Hub and Life Science precinct and contributes to its vitality.

04 STAKEHOLDERS

Enhance opportunities for the Life Science to meaningfully engage with external stakeholders, industry and the public

Engagement with external partners (industry, government or other research institutes) can stimulate interdisciplinary collaboration and increase different funding streams. The type of engagement ranges from open seminars, to externally funded applied research and integrated collaborative research projects.

THE RETURN BRIEF

A SENSE OF BELONGING/ PLACE 03

Provide nonhumans a dark refuge in the night to sleep or to hunt

To minimise the impact of artificial light on the nocturnal wildlife around the campus and to allow them to travel in the safety of the dark.

Provide a sense of place for nonhumans to live and grow

For some habitats to be protected from human intervention and can only be observed. This allows the wildlife there to live in peace and with autonomy.

STAKEHOLDERS 04

Include nonhumans as key stakeholders in the Precinct to meaningfully maintain their importance in the building

To ensure future design or construction decisions will also be made for the benefit of the wildlife to avoid a repeat of the past.

01
The Present

The current site houses a student union building with a carpark. A line of trees border the road.

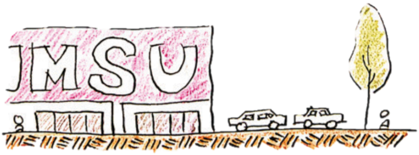

Fig. 6.1. Nicole Ren, *Sketch of The Present Site*, 2020.

02
Hassell's Proposal

The brief proposes a multistorey Life Sciences building potentially with large canopy trees on its perimeter.

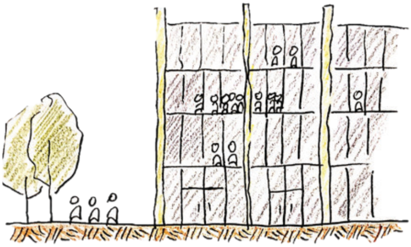

Fig. 6.2. Nicole Ren, *Sketch of Hassell's Proposal*, 2020.

03
Thesis Proposal

This thesis proposes an integration of an urban wetland with the building and campus.

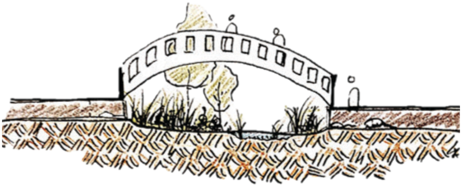

Fig. 6.3. Nicole Ren, *Sketch of Thesis Proposal*, 2020.

04
Wetland Ecosytem

A natural wetland system would be ideal for nonhumans, but it cannot be fully replicated.

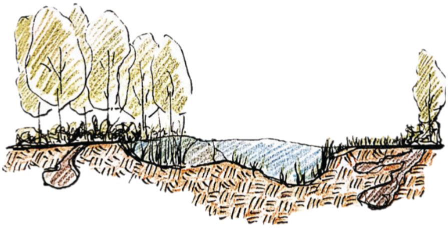

Fig. 6.4. Nicole Ren, *Sketch of Wetland Ecosystem*, 2020.

The success of the briefs can initially be compared through their likely outcomes. Though, there is no certainty in the amount of success of the proposed urban wetlands, and so it should be trialed for future reference.

4 SELECT NONHUMAN CLIENT & DEVELOPING PERSONAS

FROG CLIENTS

Frogs are the chosen client for this thesis. The selection was driven by the interest of investigating the return of the pre-existing wetlands and the majority of on campus species being nocturnal.

According to Atlas of Living Australia some of the identified frogs are nocturnal, and some are diurnal. The old lake would have also served as the main breeding ground for the frogs and its sudden disappearance will have impacted their living conditions on site.

Frogs are amphibious, the majority needing permanent water bodies to breed and mature from eggs into adult frogs.[1] The global population of frogs is on a rapid decline in part because urbanisation is eliminating possible sites for breeding, and creating polluted water bodies where tadpoles are unable to mature.[2] They are also severely impacted around the world due to a fatal fungus called Chytrid (*Batrachochytrium dendrobatidis*).

Chytrid is a contagious fungus that affects the global population of frogs by gradually thickening their skin.[3] As frogs respire through their skin, this makes making it hard for them to breathe and affects their nervous system as well. It transfers through direct contact between host and recipient.

Thus, the final design should also consider 'Anti-Chytrid' habitat measures[4] such as:
- Sunny rock piles in shallow water
- Warm and moderately saline water
- Embankments to protect from cold winds
- Shading of wetlands should be avoided, especially on anti-chytrid features e.g. rock piles
- Short vegetation and open structure (sparse shrubs/ tree planting)
- Mulch not less than 50m away from wetlands

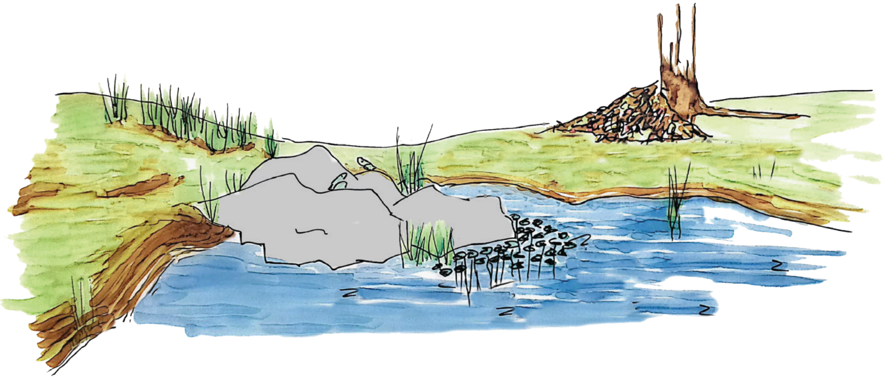

Fig.7. Nicole Ren, *Anti-Chytrid Pond*, 2020.

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1. Harold G. Cogger, *Reptiles and Amphibians of Australia*, Rev. ed (Sydney: Reed, 1979).

2.Luke P. Shoo et al., “Engineering a Future for Amphibians under Climate Change: Engineering a Future for Amphibians,” *Journal of Applied Ecology* 48, no. 2 (April 2011): 487–92, https://doi.org/10.1111/j.1365-2664.2010.01942.x.

3. MI Johnson et al., “Fungicidal Effects of Chemical Disinfectants, UV Light, Desiccation and Heat on the Amphibian Chytrid Batrachochytrium Dendrobatidis,” *Diseases of Aquatic Organisms* 57 (2003): 255–60, https://doi.org/10.3354/dao057255.

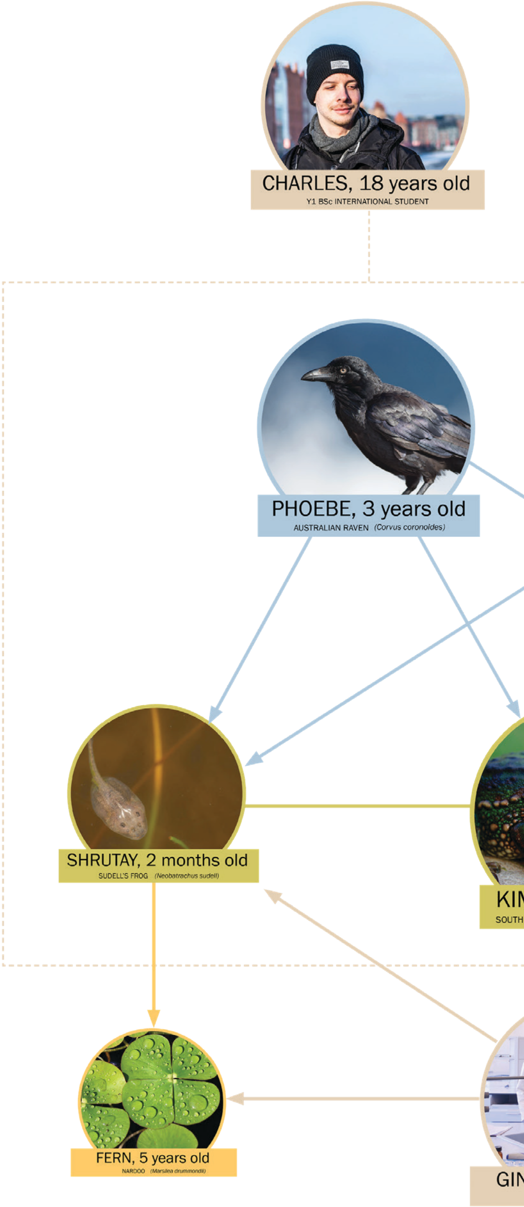
4. Land Water and Planninhg Victoria. Department of Environment, *Growling Grass Frog Habitat Design Standards: Melbourne Strategic Assessment.*, 2017, https://nla.gov.au/nla.obj-2592085609.

ESTABLISHING THE ECOSYSTEM & PERSONAS

The main clients of the project are Shrutay, Kimi, and Alex. The three species of frogs represent the different types of frogs on site: ground, water, and tree dwellers. Peron's Tree Frog is nocturnal and lives in trees, Sudell's Frog burrows underground for extended periods of time to avoid drought conditions, and the endangered Southern Bell Frog who loves sunbathing. All three breed in freshwater ponds, hence the importance of an urban wetland to their survival.[1] However, this project will have more emphasis on Kimi whose species (a.k.a Growling Grass Frog), is currently listed as endangered.

In Australia, frogs do not have many native predators.[2] Phoebe represents ravens, crows and hawks. Moosa represents the curious domestic animals who can cause harm intentionally or not. Whilst Fern is one of many pond-side vegetation that hides the frogs or their stalks are used as a breeding ground; and Marcel is a moss that is an important part of the ecosystem that grows on a large variety of surfaces.

The three humans that this design will also be tested against represent the students, researchers, and the public. Where two-thirds will generally interact passively with the frogs, whilst the researcher engages closely with the organisms in the wetlands.


CHARLES, 18 years old
Y1 BSc INTERNATIONAL STUDENT
PHOEBE, 3 years old
AUSTRALIAN RAVEN (Corvus coronoides)
SHRUTAY, 2 months old
SUDELL'S FROG (Neobatrachus sudell)
KIM
SOUTH
FERN, 5 years old
NARDOO (Marsilea drummondii)
GIN

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[1] Harold G. Cogger, Reptiles and Amphibians of Australia, Rev. ed (Sydney: Reed, 1979).

[2] Cogger.

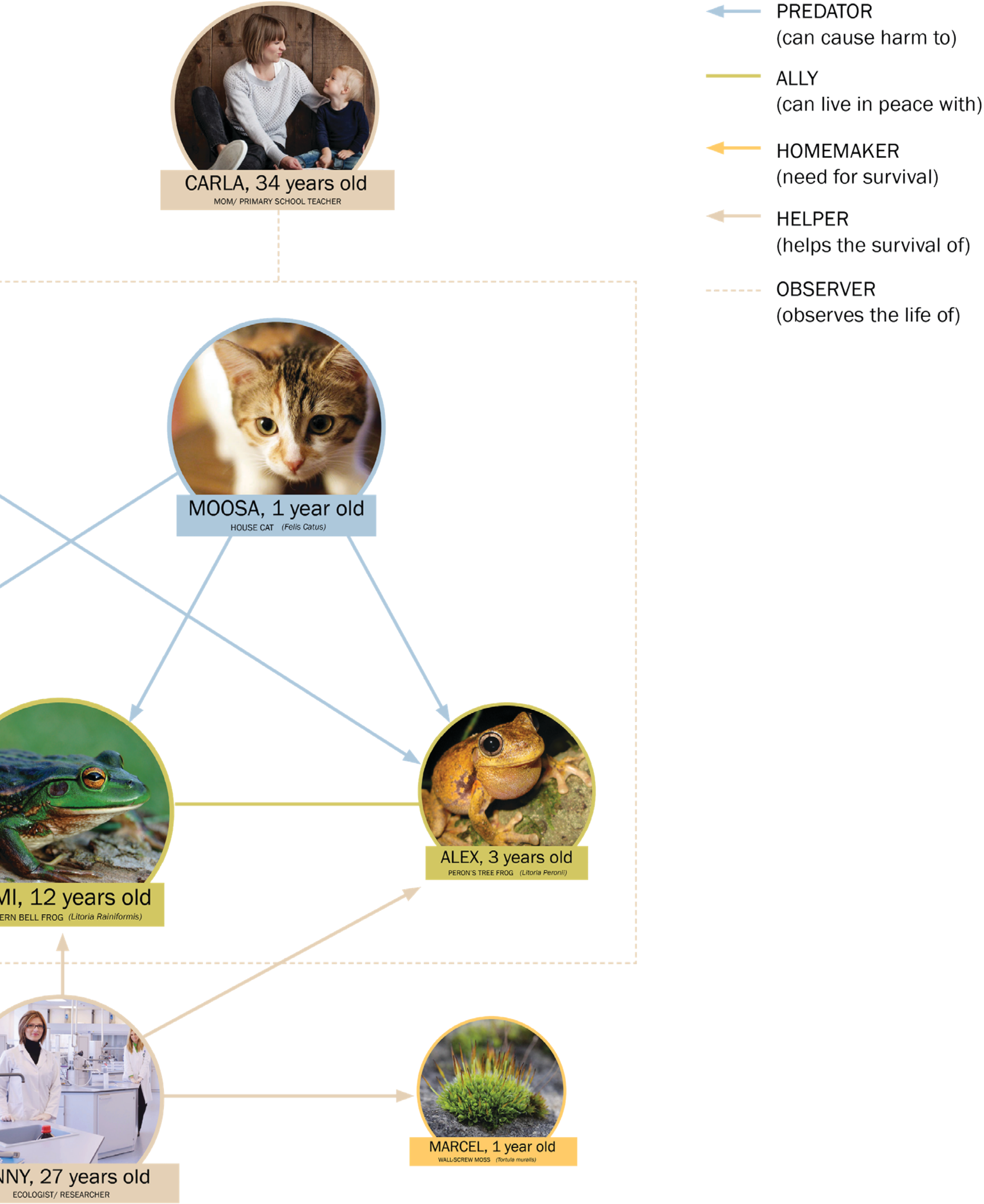


Fig. 8. Nicole Ren, *Establishing the Ecosystem*, 2020.

ALEX, 3 years old

PERON'S TREE FROG *(Litoria Peronii)*

ABOUT ME

Least Concern

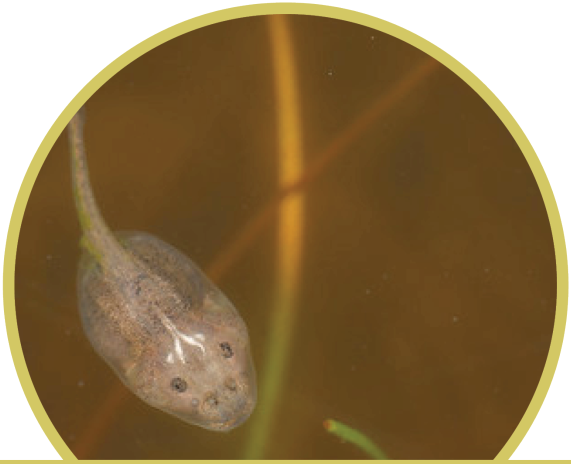
Sex: **Female**
Age: **3 years old**
Length: **50mm**

Class: **Amphibian**
Species: **Peron's Tree Frog *(Litoria Peronii)***
Endemicity: **Australia**
Diet: **Carnivore**
Nocturnal: **Yes**
Habitat types: **Forest, Open Grassland, Stream-side vegetation**

Alex has a love for climbing things, especially sticks and stones. She often races her siblings up the wall since they can climb almost any surface except for metal. Her neighbours hate her very distinctive laugh which sounds like a high-pitched cackle.

Despite being an amphibian, she prefers her cosy tree hollows or cracks instead of the water. She prefers to bathe himself to keep his skin moist, but this year she will have her first children and will need to find a safe waterbody for them to grow up. On a night out, she likes to wait near lights to hunt the insects that are attracted to the light.

"I like bathing myself in my cosy tree hollow."



SHRUTAY, 2 months old

SUDELL'S FROG *(Neobatrachus sudell)*

ABOUT ME

Least Concern

Sex: **Female**
Age: **2 months old**
Length: **66mm**

Class: **Amphibian**
Species: **Sudell's Frog *(Neobatrachus sudellae)***
Endemicity: **Australia**
Diet: **Carnivore**
Nocturnal: **No**
Habitat types: **Freshwater ponds, Woodland, Shrubland**

Shrutay's first memory is hearing her dad and uncles singing as they float in the flooded water breeding area after a heavy rain, as she is hatched a mere three days after being laid.

After the winter, Shrutay's tail will be completely gone and she will emerge from the waters as a small young frog (spanning only 20-30mm) before burrowing underground to avoid potential droughts in the summer.

Nearer to winter, after she matures, she will have her own children amongst the vegetation near the water surface.

"When I'm grown, I'd like an earthy home with a shallow pool to dip my toes."

KIMI, 12 years old

SOUTHERN BELL FROG *(Litoria Rainiformis)*

ABOUT ME

Endangered

Sex: **Male**
Age: **12 years old**
Length: **84mm**

Class: **Amphibian**
Species: **Southern Bell Frog (*Litoria Rainiformis*)**
Endemicity: **Australia**
Diet: **Carnivore**
Nocturnal: **No**
Habitat types: **Large permanent waterbodies with abundant vegetation**

He doesn’t have much to do these days. When it suits his mood and the sun is not too strong, he would find a warm patch of grass to sunbathe in, otherwise he likes to soak at the edges of still or slow-flowing waterbodies.

Although Kimi has lived a long life, he never had many children due to poor breeding grounds. His ancestors were run out of their homes when their waterbodies were drained and filled with dirt, consequential homes were polluted or tainted with pesticides; and many of his siblings fell ill to chytridiomycosis. His neighbours sympathize with his cries that sound like a goose being strangled.

“Sunbathing is my hobby.”

HELPER

GINNY, 27 years old

ECOLOGIST/ RESEARCHER

ABOUT ME

Sex: **Female**
Age: **27 years old**
Nationality: **Spanish**
Occupation: **Ecologist**
Hobbies: **Sleeping, Eating, Watching TV**

Ginny moved to Australia when she was accepted to Monash University for her Bachelors. Now, she is an ecologist focusing on ecosystem management in the urban landscape.

She is very committed to her work and often spends late nights in her lab with her colleagues. She wants to do a PhD soon; although, being stuck in the lab can get very monotonous and frustrating sometimes.

In her spare time, she would prefer to stay at home and spend time with her family.

“I love my weekends, relaxing and watching TV.”

CHARLES, 18 years old

Y1 BSc INTERNATIONAL STUDENT

ABOUT ME

Sex: **Male**
Age: **18 years old**
Nationality: **Monégasque**
Occupation: **Student**
Degree: **Science**
Major: **Undecided**
Hobbies: **Playing piano, Scuba diving, Football, Competitive cycling**

This is the first time Charles has been to Australia and is excited to start his studies here. He does not have any family here, but is sure he'll make new friends soon.

He has always lived a 15 minute walk away from the sea and goes scuba diving with his friends often. Charles is quite athletic. On most weekends, he is cycling competitively and wants to join the university cycling or football team.

Health is very important to him, so he is hoping to major in immunology or else marine biology.

"I'm excited to explore Australia and see some penguins!"

CARLA, 34 years old

MOM/ PRIMARY SCHOOL TEACHER

ABOUT ME

Sex: **Female**
Age: **36 years old**
Nationality: **Australian**
Occupation: **Primary school teacher**
Hobbies: **Gardening, Knitting, Cooking new dishes**

Carla is a primary school teacher at North Melbourne Primary School, who lives walking distance from her job. She has two boys aged 5 and 8, a family dog and a parakeet.

She enjoys teaching history, science, and about the environment. She believes it's important to teach her students how to care for the planet from a young age, and to encourage eco-friendly habits.

She looks forward to every Saturday, when a few neighbours have a social gathering where the children can play and the adults can chat. They like to change locations every few weeks so it isn't too dull.

“I can't wait to start my own compost.”

FERN, 5 years old

NARDOO *(Marsilea drummondii)*

ABOUT ME

Least Concern

Sex: **Female**
Age: **5 years old**
Length: **400mm**

Class: **Fern**
Species: **Nardoo *(Marsilea Drummondi)***
Endemicity: **Australia**
Habitat types: **Freshwater ponds,**

Fern and her ancestors have lived in Australia ever since she can remember from her sporocarp days. She is an aquatic fern that loves to peacefully float on the surface of quiet waters whilst digging her roots into the muddy surface below. Her sister was almost a meter tall!

Her offspring are produced in sporocarps that can last up 50 years before being released by birds who eat them but can't digest them or flowing water.

Some humans have also grinded her sporocarps into powder to make dough and food for themselves.

"I like my peace and quiet."

MARCEL, 1 year old

WALL-SCREW MOSS *(Tortula muralis)*

ABOUT ME

Least Concern

Sex: **Male**
Age: **1 year old**
Height: **10 mm**

Class: **Bryopsida**
Species: **Wall-screw Moss (Tortula Muralis)**
Endemicity: **Australia**
Habitat types: **High sun-exposure, Dry**

Without flowers or being four metres tall, Marcel is often overlooked as an important part of the ecosystem.

Being a moss, he absorbs nutrients from the air and water, especially when it rains. So, Marcel is extremely sensitive to changes in the environment. Monitoring his growth and biological responses can be used to track long-term air pollution quality.

He has siblings and cousins living everywhere, in concrete, cement, brick walls, rocks and tree barks, some are even in Europe, Asia, and Africa.

“I like my spikey hair.”

PHOEBE, 3 years old

AUSTRALIAN RAVEN *(Corvus coronoides)*

ABOUT ME

Least Concern

Sex: **Female**
Age: **3 years old**

Class: **Bird**
Species: **Australian Raven *(Corvus Coronoides)***
Endemicity: **Australia**
Diet: **Omnivore**
Nocturnal: **No**
Habitat types: **Forest, Open Grassland,**

“Once I stole an egg that was actually a golf ball”

MOOSA, 1 year old

HOUSE CAT *(Felis Catus)*

ABOUT ME

Least Concern

Sex: **Male**
Age: **1 year old**

Class: **Mammal**
Species: **House Cat *(Felis Catus)***
Endemicity: **Naturalised from overseas**
Diet: **Carnivore**
Nocturnal: **No**
Habitat types: **Almost anywhere**

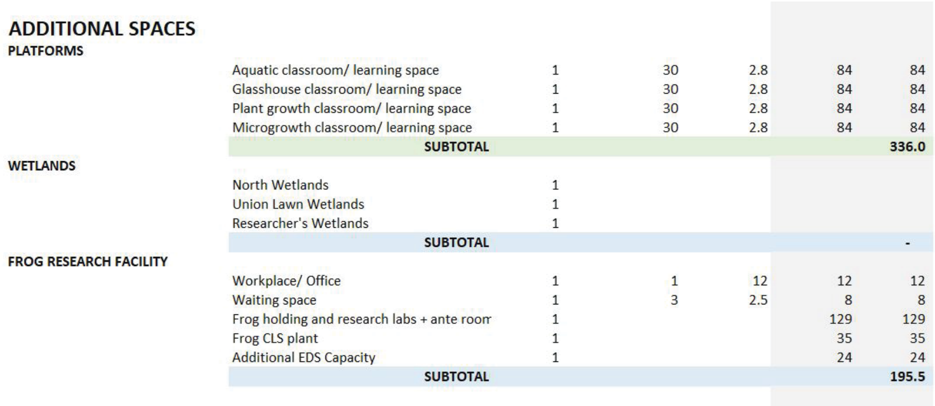
"I love exploring and chasing things."

5 DESIGN OPPORTUNITIES TO TEST

SCHEDULE OF ACCOMMODATIONS

Investigating the given schedule of accomodations and adding neccessary programs as the personas have required to the site provides a baseline to which future iterations and designs can be compared against. It will demonstrate a clearer understanding in how the proposals attain the aspirations of the return brief.

The schedule of accommodations was added to (see Figure 9), to include the necessities for the wetlands and a newly dedicated frog research facility which will provide an opportunity to increase the significance of frogs on site beyond ‘interspecies design’ but to give them more agency and relevance in helping the global situation of frogs; whilst the platform spaces took from STEMM and LSP classrooms to have more integrated learning in industry level environments.



ADDITIONAL SPACES						
PLATFORMS						
	Aquatic classroom/ learning space	1	30	2.8	84	84
	Glasshouse classroom/ learning space	1	30	2.8	84	84
	Plant growth classroom/ learning space	1	30	2.8	84	84
	Microgrowth classroom/ learning space	1	30	2.8	84	84
	SUBTOTAL					**336.0**
WETLANDS						
	North Wetlands	1				
	Union Lawn Wetlands	1				
	Researcher's Wetlands	1				
	SUBTOTAL					**-**
FROG RESEARCH FACILITY						
	Workplace/ Office	1	1	12	12	12
	Waiting space	1	3	2.5	8	8
	Frog holding and research labs + ante room	1			129	129
	Frog CLS plant	1			35	35
	Additional EDS Capacity	1			24	24
	SUBTOTAL					**195.5**

Fig. 9. Nicole Ren, *Additional spaces for the schedule of accomodations*, 2020.

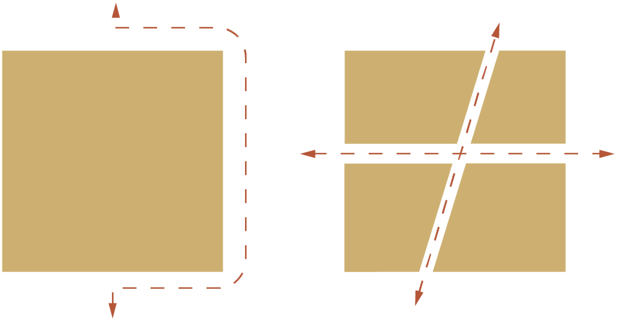
CONCEPT DIAGRAMS

The building's form should also include these concepts: shortcuts, layers of darkness, and anchor points.

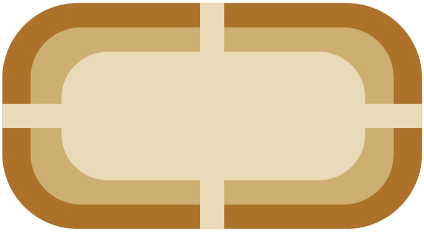
As the site is quite big, passageways or shortcuts on the ground plane are necessary for efficiency.

Next, the layering of darkness. The outer layer has a separate closing time to the rest of the building and 'lights out' will also depend on the sunset hour and daylight saving. At the core are areas open for after hours work, like research labs or informal study spaces, leaving the entrances as the only punctures of light to the outside. This does not mean that the core is composed only of labs. Organising programs based on their operational hours is a method for reducing the total artificial light to the outside.

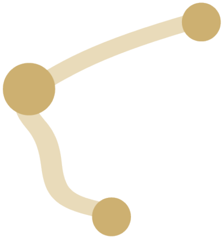
Meanwhile, anchor points are specific spaces that serve multiple user groups and are scattered at different edges of the building to encourage 'wandering'. It plays on the importance of circulation and passive engagement with the surrounding programs. With the focus on exposing students to more real world research projects, thus the anchor points will be their classrooms or informal learning spaces whilst research facilities line the way.



shortcuts



layers of darkness



anchor points

Fig. 18. Nicole Ren, *Concept diagrams*, 2020.

> *"...nature could be a garden – not a carefully manicured and rigid one, but a tangle of species and wildness amidst lands used for food production, mineral extraction, and urban life."*
>
> *– Karieva, Marvier & Lalasz*[1]

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[1] Collard, Dempsey, and Sundberg, "A Manifesto for Abundant Futures."

[2] Andrew Juniper, Wabi Sabi: The Japanese Art of Impermanence. (New York: Tuttle Pub., 2011), https://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1568196.

DIRT & IMPERFECTIONS

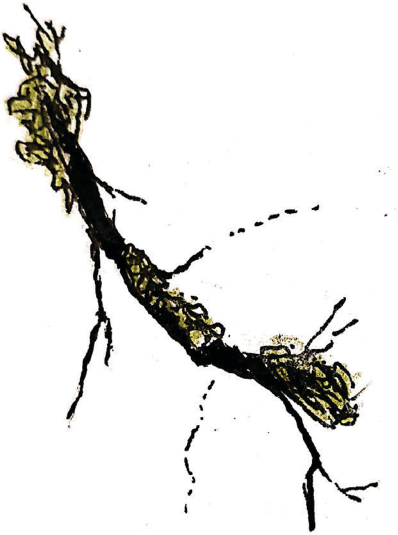
As this thesis explores ways to reintroduce dirt and alternate life back into the building, the building and smaller scale begin to merge as one informs the other, here the concept of Wabi-Sabi provides key ideas and aesthetic inspiration.

Wabi-Sabi is an aesthetic that enjoys the “imperfect, impermanent, and incomplete”.[2] It is an idea that can apply to the frog scale of design, where materiality can be explored to link the building to the wetlands as well as to consider the frogs’ interaction with the built environment.

Humans in the city tend to have an obsession with things being ‘sparkling clean’ and void of any signs of other lifeforms. The quote from *A Manifesto for Abundant Futures*, and concept of Wabi-Sabi is about finding the beauty in the imperfection of nature and the natural. To embrace it in its raw form: unruly, wild, and unkempt.

侘寂

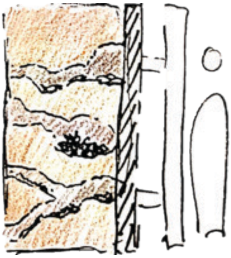
Wabi-sabi



imperfection

Designing and identifying the flaws and imperfections of the building and site; and exploiting them to benefit nonhumans, like designing the way the façade cracks to allow moss or small animals to grow and shelter.

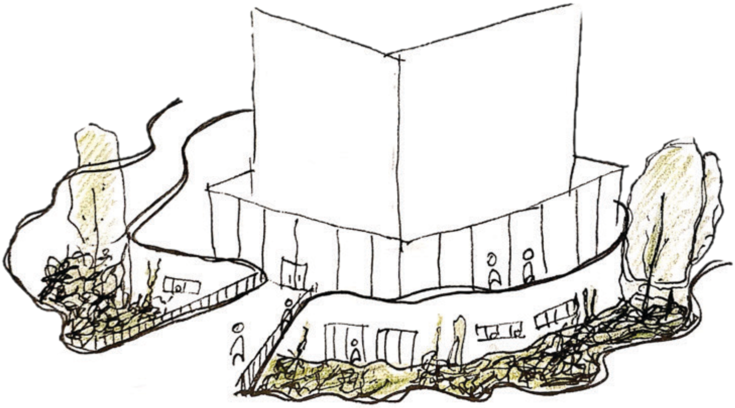
Fig. 10.1. Nicole Ren, *Façade Crack*, 2020.



materiality

Exploring the implications of natural material such as leaf piles, soil, irregular timber or rammed earth. It allows nonhumans to be immediate agents in the quality and form of the habitats provided for them by carving out their own homes on site.

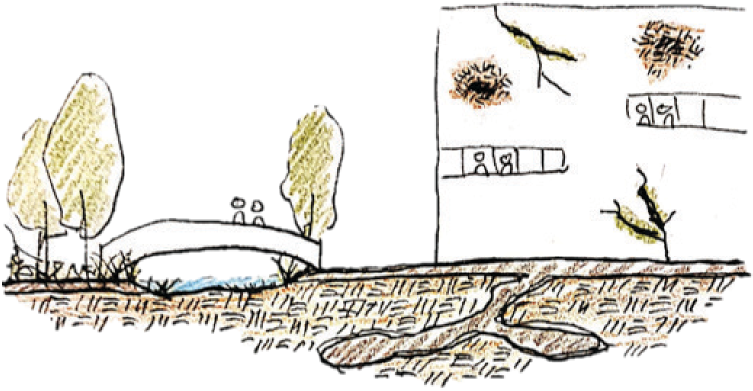
Fig. 10.2. Nicole Ren, *An Impermenant Façade*, 2020.



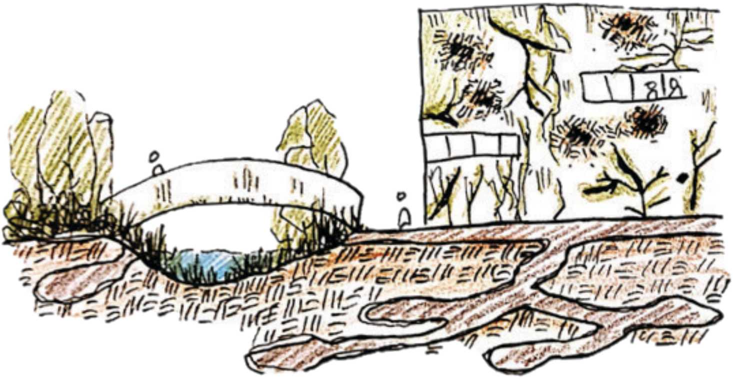
transformation

The aesthetic quality and natural processes of material over time will be considered as the building should occupy the site for at least a few decades. The necessity of underground culverts, artificial shelters and shrubs on site will also provide more intimate habitats and protection for the frogs against their predators.

Fig. 10.3. Nicole Ren, *A Green Moat*, 2020.



in 10 years



in 50 years

Fig. 10.4. Nicole Ren, *Aesthetic over time*, 2020.

In further consideration of time as a design factor, the hours of the day and months are analysed to determine which users are on site and whether their activities coincide or happen when the other is not there. Either condition will result in a different design response.

Figure 11.1 correlates the seasonal usage of the site and the activities of the human and non-human users. Semester Two overlaps with Poorneet, the Tadpole season and is one of the rainiest months. It indicates additional design measures and human access restrictions will be required during those months.

Figure 11.2 indicates that the majority of the non-human users, in green, will be active during the hours between evening and dawn. Whilst the majority of human users will be on site from 7AM to 7PM. This informs the potential of a dual design, where the building can transform to fit another purpose depending on the hour of the day.

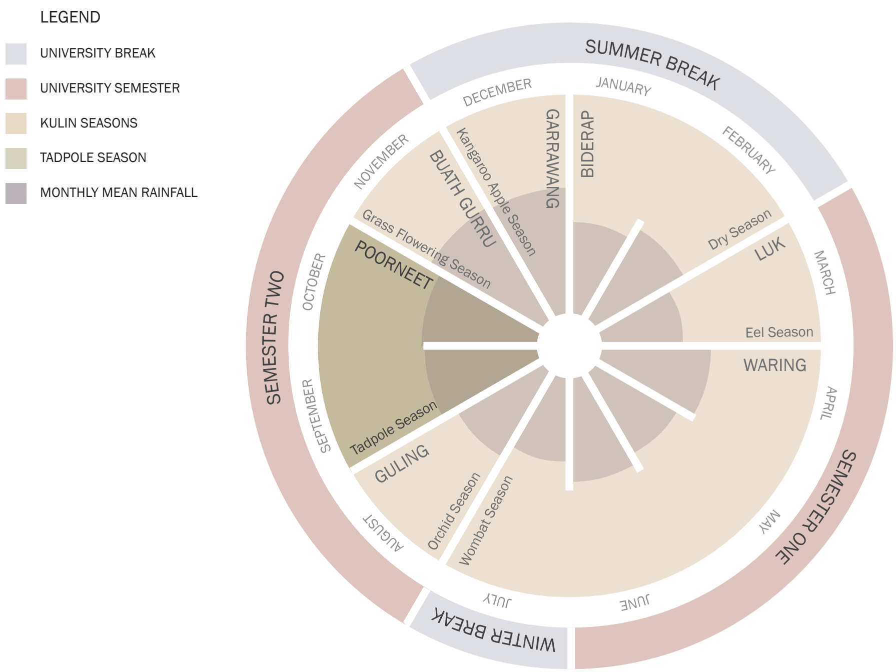


Fig. 11.1. Nicole Ren, *Yearly seasons and semesters*, 2020.

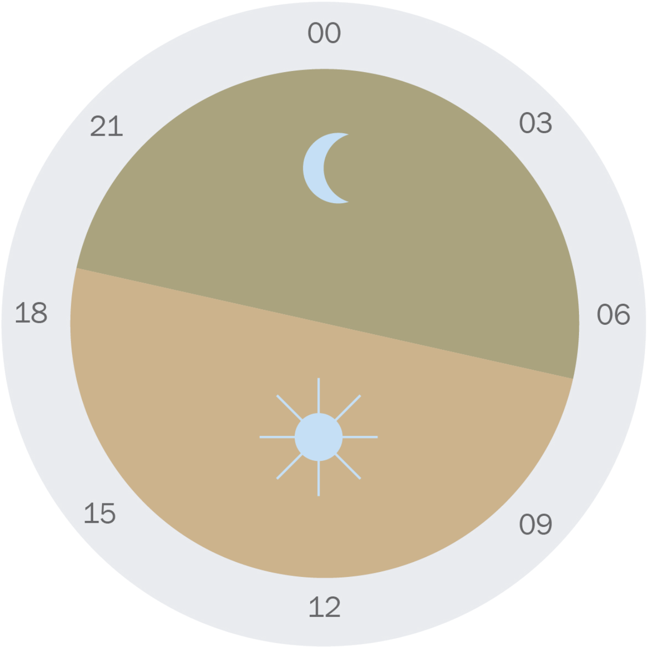


Fig. 11.2. Nicole Ren, *Hours of the day*, 2020.

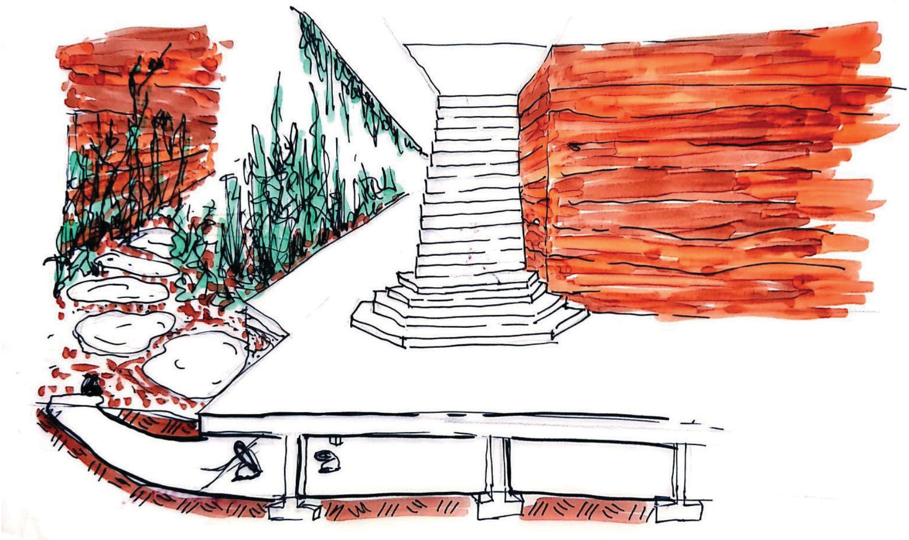


Fig. 12. Nicole Ren, *The Edge Condition - opening to nature*, 2020.

The Edge Condition

The edge condition is the boundary between dirt/ cleanliness, dark/light and usually nonhumans/ humans. The architecture aims to mediate the physical edges where this edge blurs into a gradient to which dirt, darkness, and nonhumans can trespass.

One method is through employing living concrete and rammed earth as the main construction material for the buildings. Its aesthetic, texture, and procurement vastly contradicts the shiny glass and high embodied energy steel commonly used in large buildings, especially in the city.

Rammed Earth

Rammed earth is an ancient technology that has been used for thousands of years to build homes or shelters.[1] It can be used as a structural system generally measuring up to 500mm thickness with cement stabilizers.[2]

The soil used in rammed earth can be obtained from the land on which it is built, provided that it passes a quality test to ensure it is safe and uncontaminated. This provides a unique characteristic to every rammed earth building as the colour is geographic dependent. Due to its compact nature, rammed earth is also relatively water resistant although water may penetrate a few cm from the surface but quickly evaporates when the weather is warmer.

Despite being made of earth, the compact and dense nature of the rammed earth means small mammals cannot burrow their way into the facade else structural issues will quickly arise. So alternate methods of introducing nonhumans into the facade will be explored.

PROS:
_organic aesthetic
_not a lot of waste material
_ earth dug from site can be used
_locally sourced material, reduced embodied energy/carbon
_high thermal mass, durability, fire resistance & moisture resistance
_lower reconstruction fee
_non-toxic
_soundproof
_can be loadbearing/ structural

CONS:
_low energy efficiency
_need high skilled labour
_poor insulation (mycelium insulation)
_nonhumans cannot burrow into it after it cures,
_can be expensive

Living Concrete

Living concrete will help blur the boundary between the inside and out by being incorporated into a building's structure to bring nature into the buidling. As living walls in densely urban areas are expensive, living concrete significantly reduces these costs.[3]

Initial trials of the experimental material has shown that the plants are able to grow from seen in-situ with little maintenance or help[4], indicating that once implemented, there is little need for human intervention and it can grow and develop its own ecosystem within the walls of a building.

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[1] Gernot Minke, Building with Earth: Design and Technology of a Sustainable Architecture (Basel: Birkhäuser, 2006).

[2] Peter Walker and Standards Association of Australia, The Australian Earth Building Handbook (Sydney: Standards Australia International, 2002).

[3] Benjamin Riley et al., "Living Concrete: Democratizing Living Walls," Science of the Total Environment 673 (2019): 281–95, https://doi.org/10/gf62cp.

[4] Riley et al.

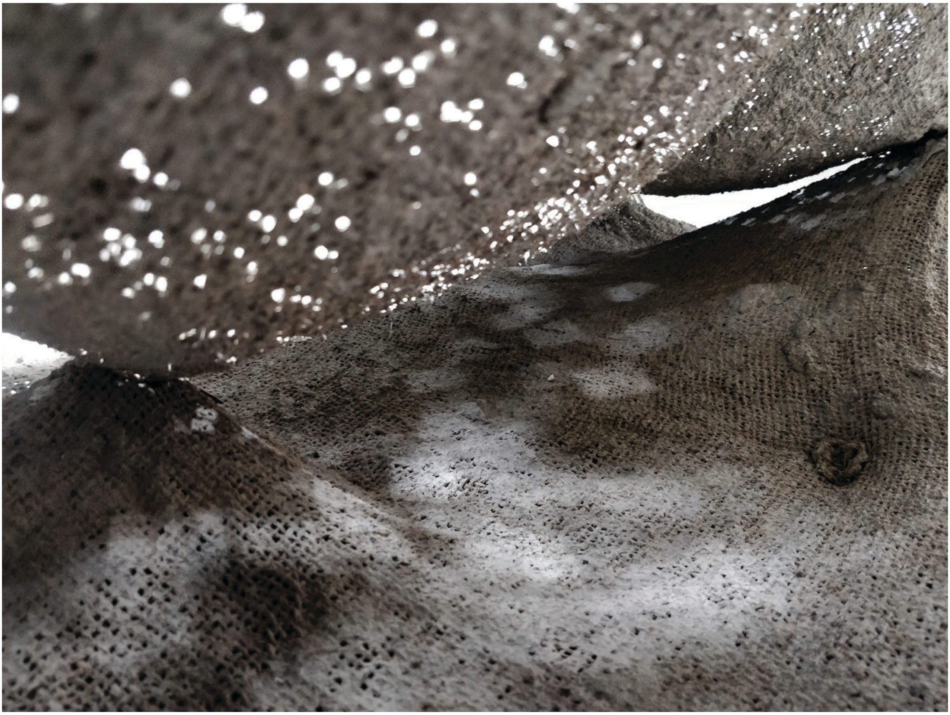

Fig. 13. Nicole Ren, *Porosity in textile reinforced fabric*, 2019.

QUALITIES OF LIGHT

As majority of nonhumans are noctural, and the site should be returned to them after-hours, the negative impacts of light must be reduced. In designing to reduce of artificial light at night the definition and of artificial light should be questioned. What constitutes as 'artificial' and 'natural' light? Light that is 'man-made'? Light that is produced by the natural rotation of the earth, like sunlight and moonlight? Or is it light from electrical sources?

Light can come from many sources and thus their qualities, atmosphere, colour, and warmth varies drastically. Whilst initial connotations of artificial light imagine harsh bright lighting, other man-induced lighting includes candlelight, filtered, or dispersed light like paper lanterns and stain glass windows.[1]

As a part of exploring potential construction materials and ways to achieve the aspirations, sketch or conceptual models can be used to see how light can also be a material to affect texture and shadows. In Figure 13, the porosity allows in light, but as it hits the floor it disperses into a softer glow that is easier on the eyes. It provides a luminescent glow instead of harsh bright lighting.

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[1] Jun'ichirō Tanizaki, *In Praise of Shadows*, 6th ed. (Leete's Island Books, 1977).

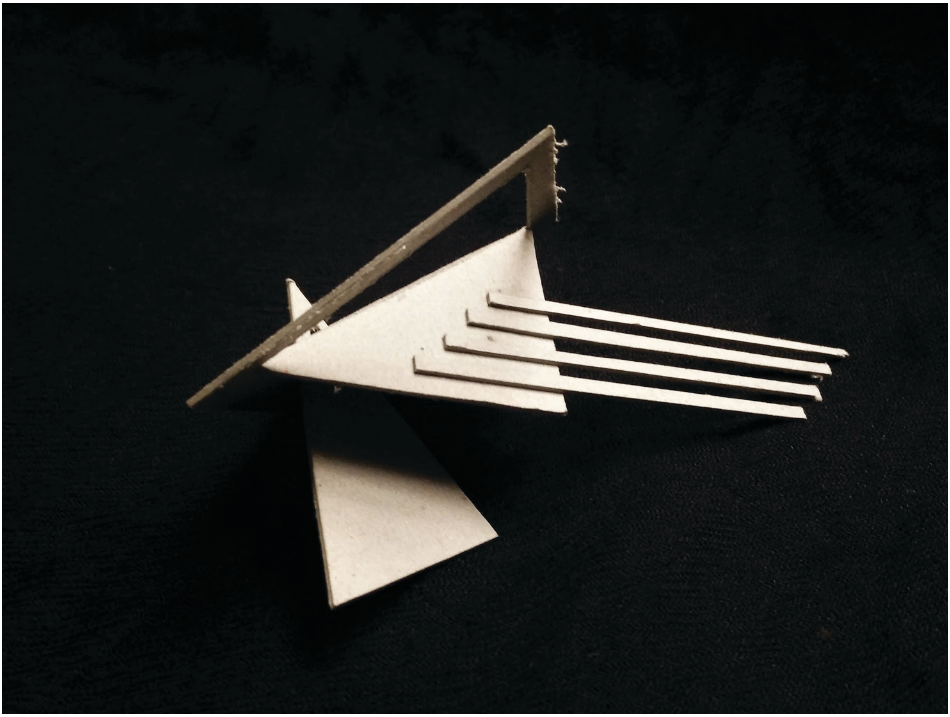

Fig. 14.1. Nicole Ren, *Sketch model: Shadows and Angles*, 2020.

Artificial light can be reduced in various ways. Balancing the use of artifical light and orientation of building surfaces can create dual and contrasting atmospheres, on one side a clearly lit facade and, the other, a deeper and darker cover for nonhumans to reside (Figure 14.1).

Shadows and angles of artificial light on multiple adjacent buildings can be explored to provide interconnected dark corridors on campus for nonhumans, whilst still providing necessary light for security and safety for humans at night.

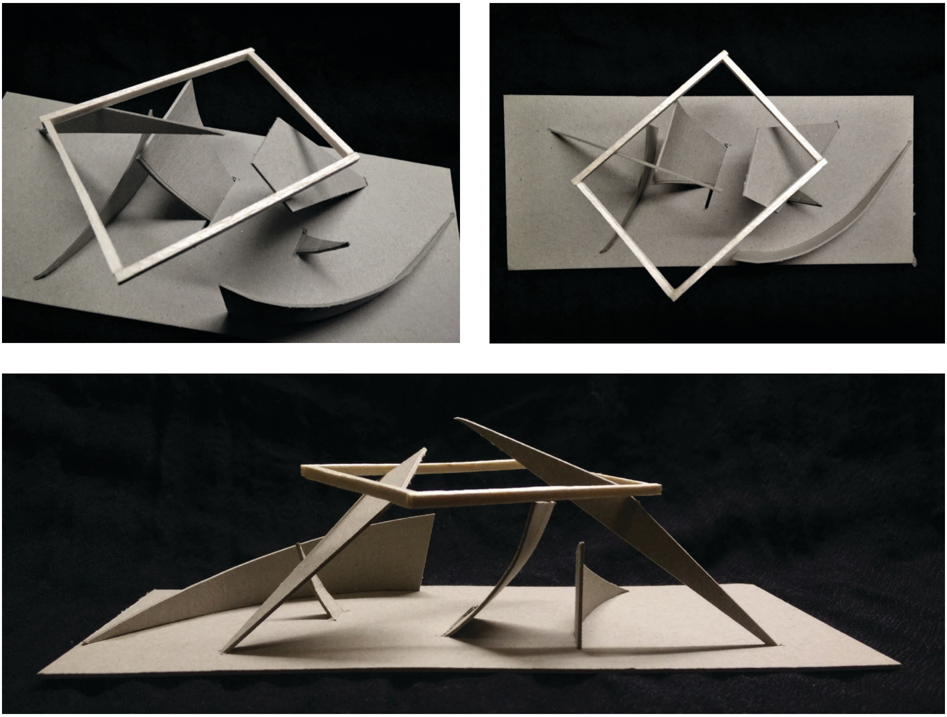

Fig. 14.2, 14.3, 14.4. Nicole Ren, *Sketch model: Protrusions and Angles*, 2020.

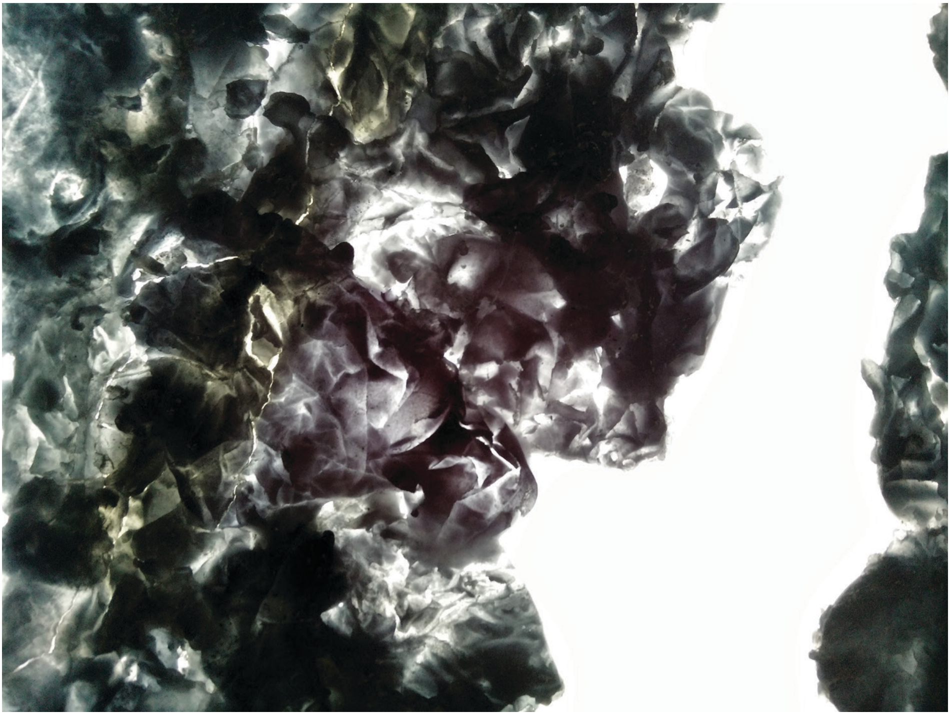

Fig. 15.1. Nicole Ren, *Backlit wax on glass*, 2017.

Several characteristic of materials interact with light: opacity, porosity, and texture.

In an experimentation with wax on glass, density, opacity and texture was investigated. The effects of being frontlit versus backlit created different opacities and highlighted different textures on the material. The coarseness imitates the natural, unrefined surfaces of rocks.

Tinted and warped glass can become methods in reducing the effect of artificial lighting at night, whilst still giving a performative and dynamic experience.

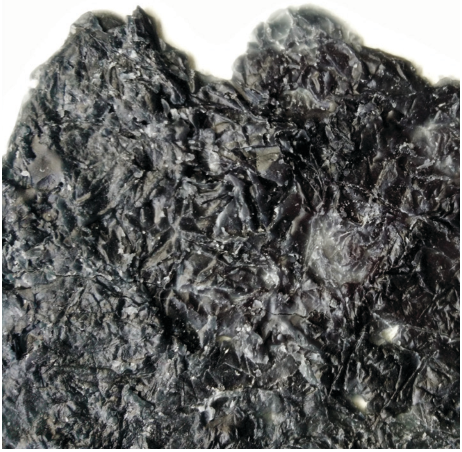

Fig. 15.2. Nicole Ren, *Frontlit wax on glass*, 2017.

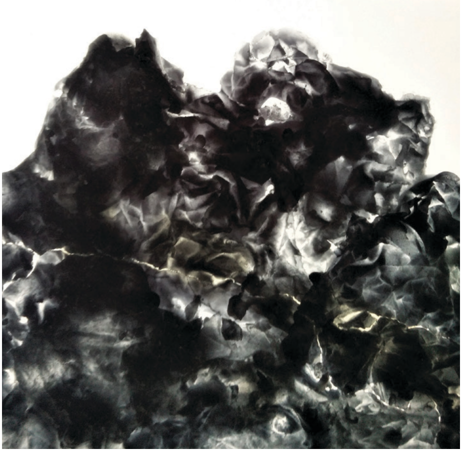

Fig. 15.3. Nicole Ren, *Backlit wax on glass*, 2017.

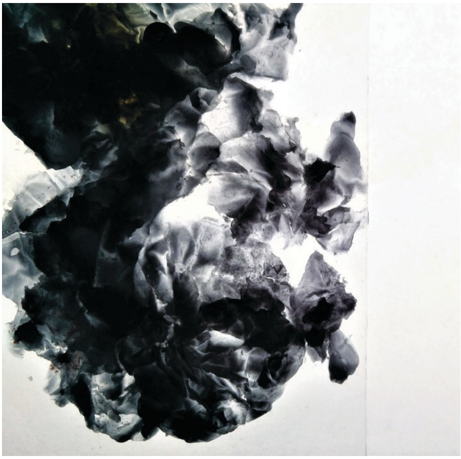

Fig. 15.4. Nicole Ren, *Backlit wax on glass*, 2017.

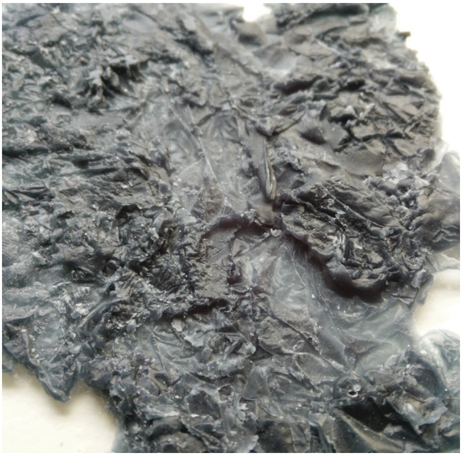

Fig. 15.5. Nicole Ren, *Frontlit wax on glass*, 2017.

6 THREE SCALES OF DESIGN

The project will include the brief through three specific scales of design to address the hypothesis and aspirations. This will consider the holistic impact of the environment on frogs and vice versa.

URBAN

Connecting habitats across site

BUILDING

Integrating nonhumans into the building and reducing artifical light

FROG

Design for their different characteristics

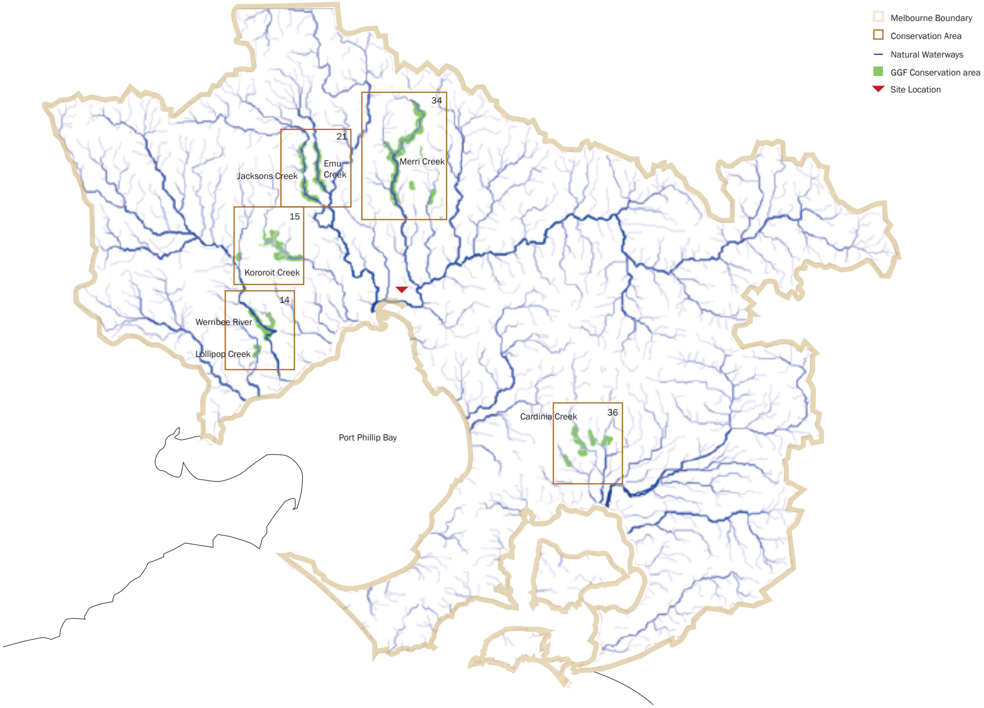

Fig. 16.1. Adapted from *GGF Masterplan for Melbourne's Growth Corridors, Map of GGF conservation areas*, 2020.

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1. Victoria. Department of Environment, *Growling Grass Frog Masterplan for Melbourne's Growth Corridors: Melbourne Strategic Assessment.*, 2017, https://nla.gov.au/nla.obj-2630754640.

2. Land Water and Planning Victoria. Department of Environment, *Growling Grass Frog Crossing Design Standards: Melbourne Strategic Assessment.*, 2017, https://nla.gov.au/nla.obj-2592085957.

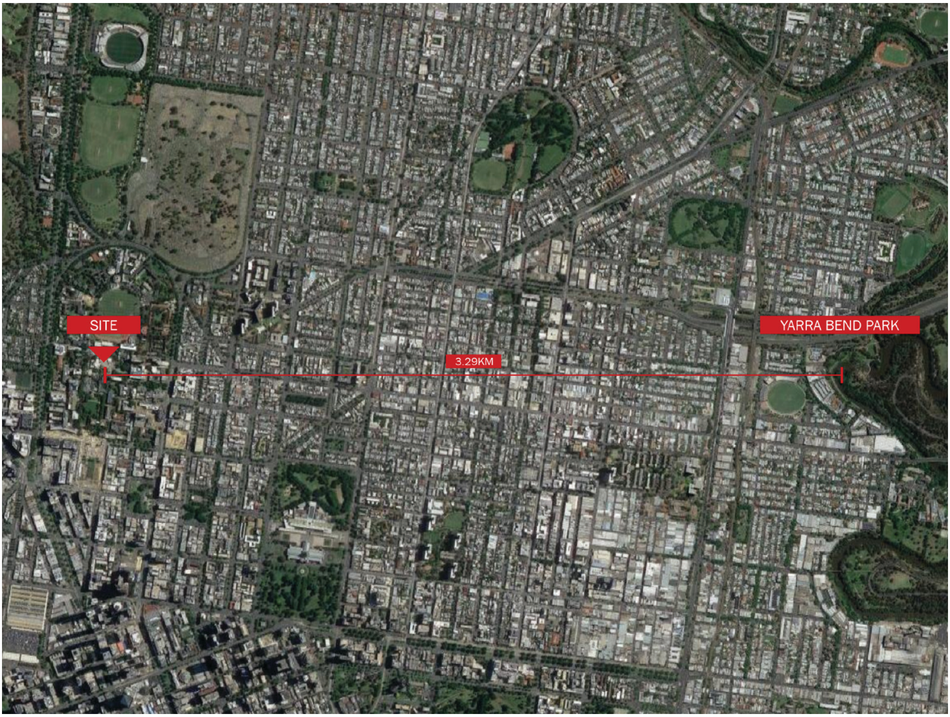
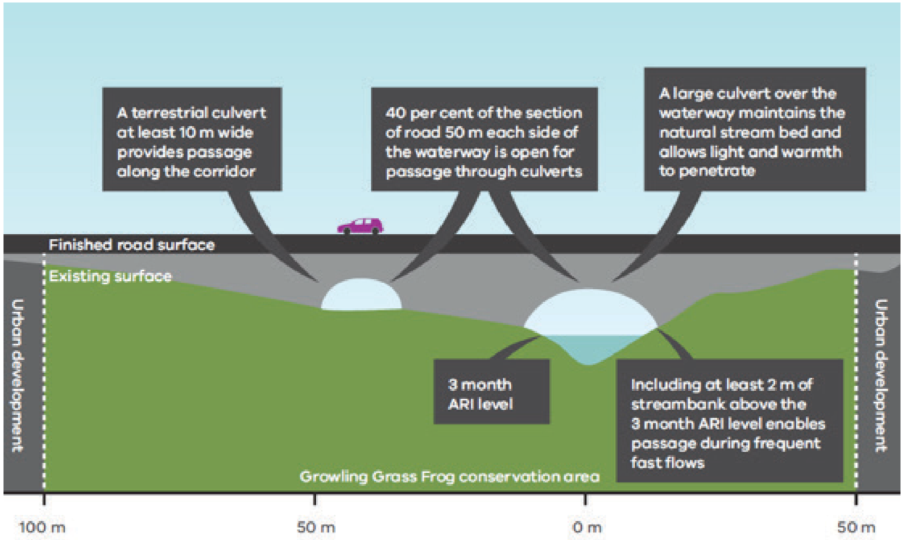


Fig. 16.2. Google Maps, *Site distance from Merri Creek,* 2020.

FROGS IN THE URBAN LANDSCAPE

At the urban scale there exists a 2017 masterplan in five locations along Melbourne's main creeks that were identified as Growling Grass Frog conservation locations.[1] The closest to site is along the Merri Creek, which flows through Yarra Bend Park in the East, located roughly 3.3km away from the site (see Figure 16.2).

Realistically, it would be difficult to propose a direct connection from the site to Yarra Bend Park. Alternatively, there have been several suggestions and studies on the adaptations of frogs in the urban landscape that can help.[2]


A terrestrial culvert at least 10 m wide provides passage along the corridor
40 per cent of the section of road 50 m each side of the waterway is open for passage through culverts
A large culvert over the waterway maintains the natural stream bed and allows light and warmth to penetrate
Finished road surface
Existing surface
Urban development
Urban development
3 month ARI level
Including at least 2 m of streambank above the 3 month ARI level enables passage during frequent fast flows
Growling Grass Frog conservation area
100 m
50 m
0 m
50 m

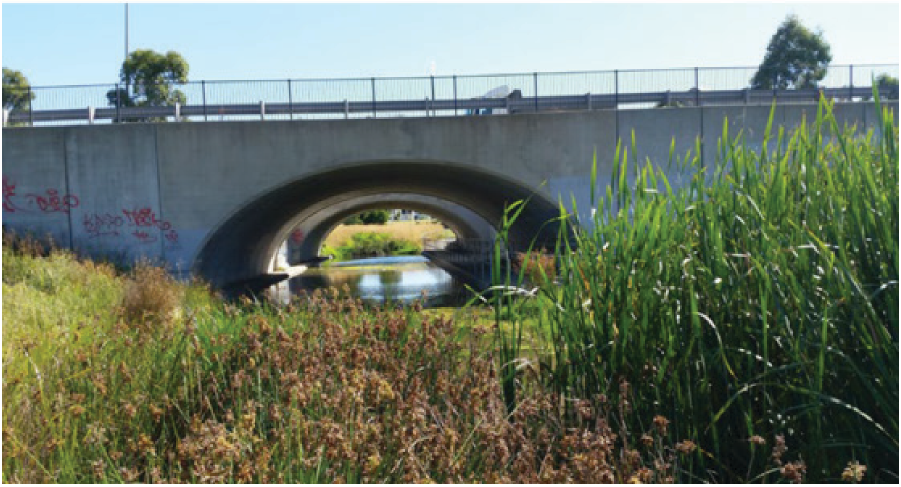


Fig. 16.3. Victoria Dept. of Environment , *Crossing with arched culverts*, 2020.

As roads are very dangerous some urban interventions include underpasses, large drainage pipes, or culverts. These become safe passages from fast moving cars or large predators.[3] Some frogs have also adapted to use these tunnels as amplifiers for their mating calls.[4] Smaller versions of these can also be explored to connect other green spaces on campus.

The Growling Grass Frogs tend to migrate during rainy nights only if their habitat is drying up and is unsuitable for breeding or for living comfortably. Tall reeds are necessary to provide visual protection for adult frogs and submerged or floating vegetation for protecting the eggs and tadpoles.[5] By providing a permanent and safe water body on site, the risks of migration are reduced and the survival of the species becomes more certain.

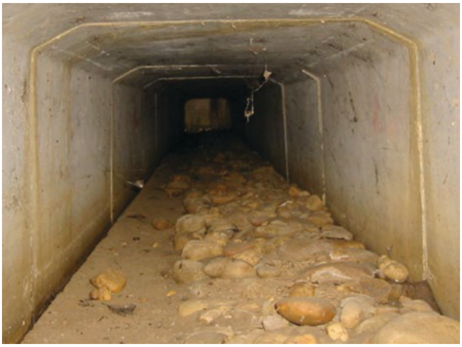


Fig. 16.4. Victoria Dept. of Environment , *Underground culvert*, 2020.

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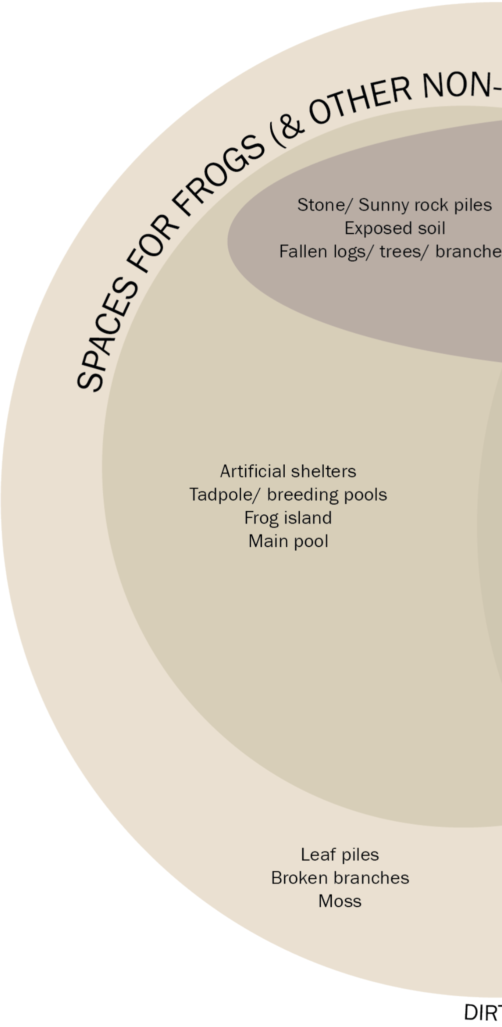
[3] Sally L. Koehler and Daniel C. Gilmore, “First Documented Use of Underpass Culverts by the Endangered Growling Grass Frog (Litoria Raniformis) in Australia.”, *Herpetological Review* 45, no. 3 (2014): 404–8; Geoffrey Heard et al., *Guidelines for Managing the Endangered Growling Grass Frog in Urbanising Landscapes*, 2010, http://nla.gov.au/nla.obj-528545946.

[4] Kirsten M. Parris, Meah Velik-Lord, and Joanne M. A. North, “Frogs Call at a Higher Pitch in Traffic Noise,” *Ecology and Society* 14, no. 1 (2009): 25.

[5] Land Water and Planninhg Victoria. Department of Environment, *Growling Grass Frog Habitat Design Standards: Melbourne Strategic Assessment.*, 2017, https://nla.gov.au/nla.obj-2592085609.



CATEGORIES OF DESIGN

This venn diagram summarises the results of findings. It depicts each category of design to consider and how they intersect with the concept of dirt and cleanliness. It illustrates the shared materiality and programming of spaces on site.

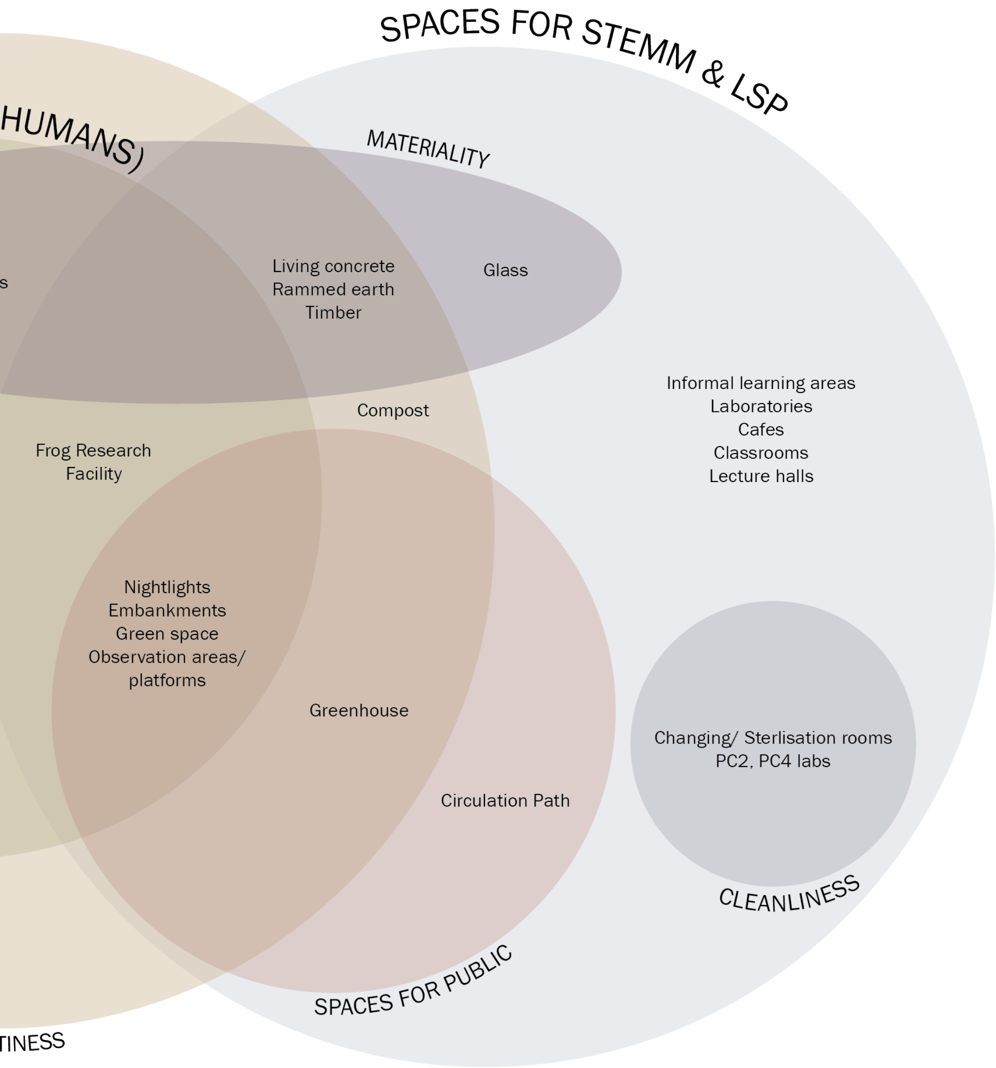


Fig. 17. Nicole Ren, *Diagramming the intersection of spaces, concepts, and materiality*, 2020.

This section will discuss the initial design responses to the results, including initial sketches that lead to Anurapolis.

INITIAL CONCEPT

The ideal habitat for the frogs on site would be a large wetland, and the ideal building for Unimelb would be Hassell's proposed massing (Figure 1.2). Poor circulation and a forced merging of forms is undesirable.

The moat in Figure 1.3 is a rather unique proposition for a university setting, and the potential transmission of Chytrid between amphibians should be considered. The possibility of segmenting into multiple ponds (Figure 1.1) could be proposed. This also allows easier maintenance, or relocation of its inhabitants to another pond if necessary – for isolation or localised refurbishment in that area or other factors.

06 ANALYSIS

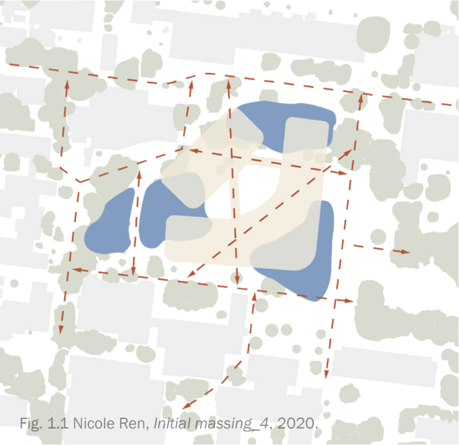


Fig. 1.1 Nicole Ren, *Initial massing_4*, 2020.

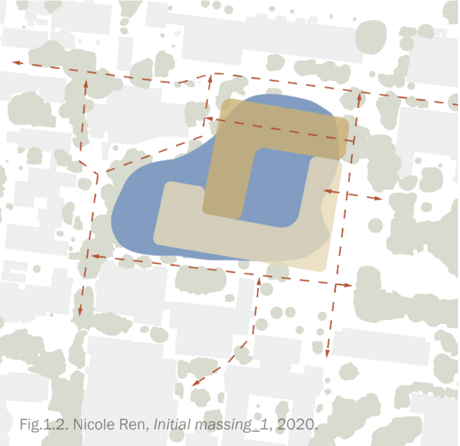


Fig.1.2. Nicole Ren, *Initial massing_1*, 2020.

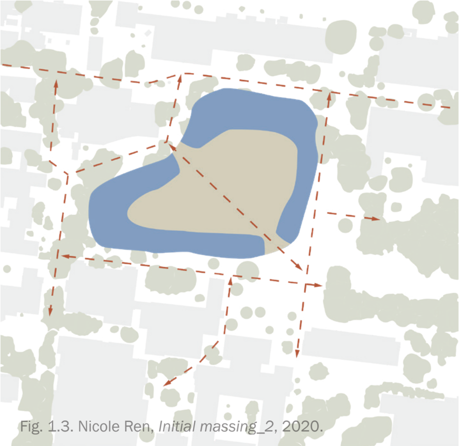


Fig. 1.3. Nicole Ren, *Initial massing_2*, 2020.

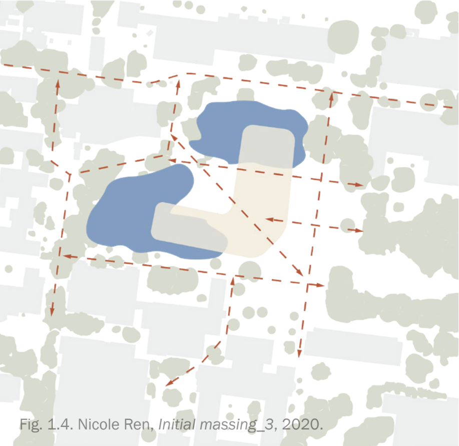


Fig. 1.4. Nicole Ren, *Initial massing_3*, 2020.

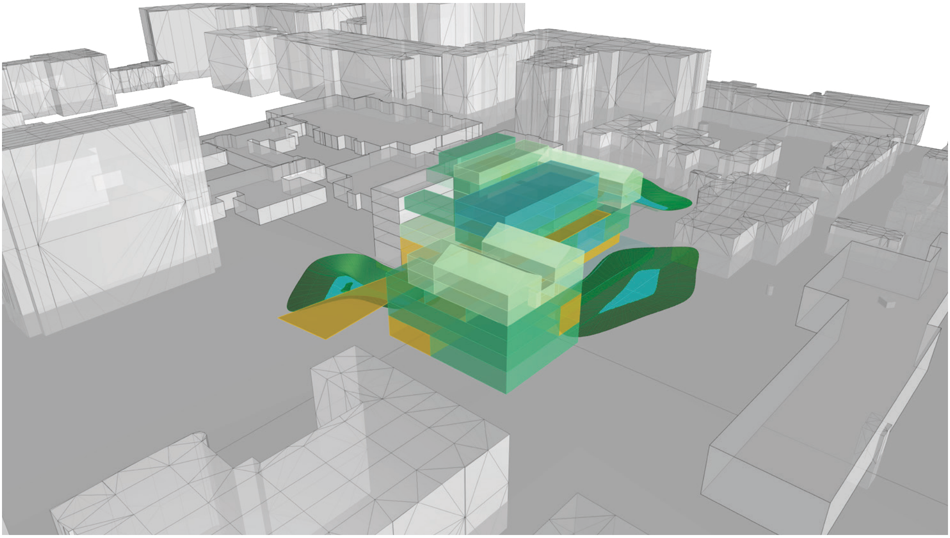


Fig. 2.1. Nicole Ren, *Massing of Hassell brief & additional spaces*, 2020.

INITIAL_ MASSING

This massing is from the original schedule with the additional spaces included, was created to be a comparison against future design proposals.

The massing began with determining the placement of the wetlands. One was placed in the north to enhance the sense of arrival and landmarking as an entrance feature open to the public.

The eastern pond linked the green space of union lawn to the site, where the ground plane dips down and some of the perimeter of the ponds become accessible to the public to sunbathe with the frogs, or for other nonhumans to use as a clean water source.

Whilst, the western pond links the site to the system garden and is where the researchers can conduct their research on frogs.

The anchor points of STEMM spaces were then put in. Next, the research hubs were integrated, along with the platform spaces, trying to find a balance between industry and education throughout the building. The public spaces and circulation then joined all these together.

The result: a very dense and deep building not innovative nor ideal to incorporate nonhumans.

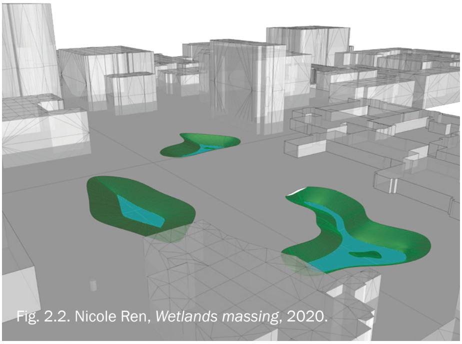


Fig. 2.2. Nicole Ren, *Wetlands massing*, 2020.

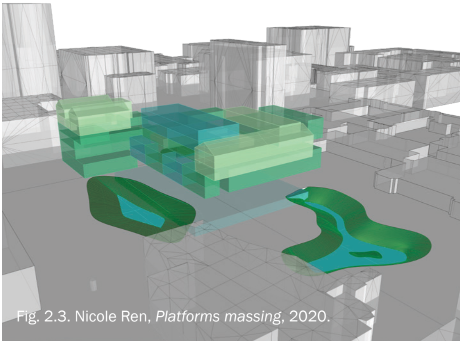


Fig. 2.3. Nicole Ren, *Platforms massing*, 2020.

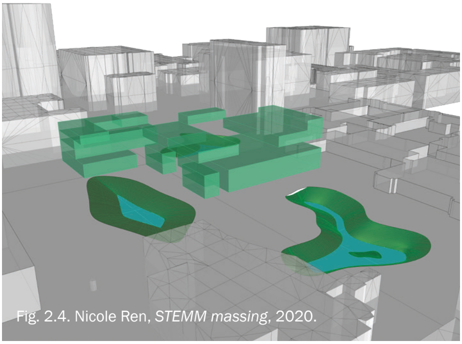


Fig. 2.4. Nicole Ren, *STEMM massing*, 2020.

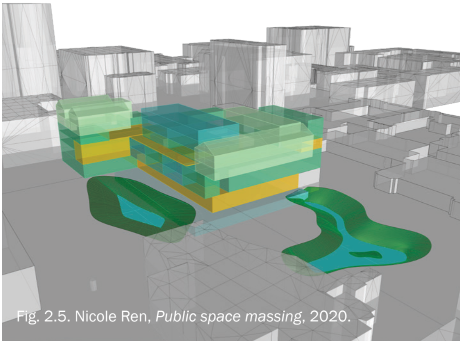


Fig. 2.5. Nicole Ren, *Public space massing*, 2020.

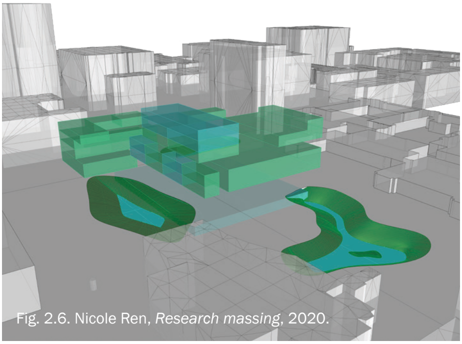


Fig. 2.6. Nicole Ren, *Research massing*, 2020.

INITIAL DESIGN SKETCHES

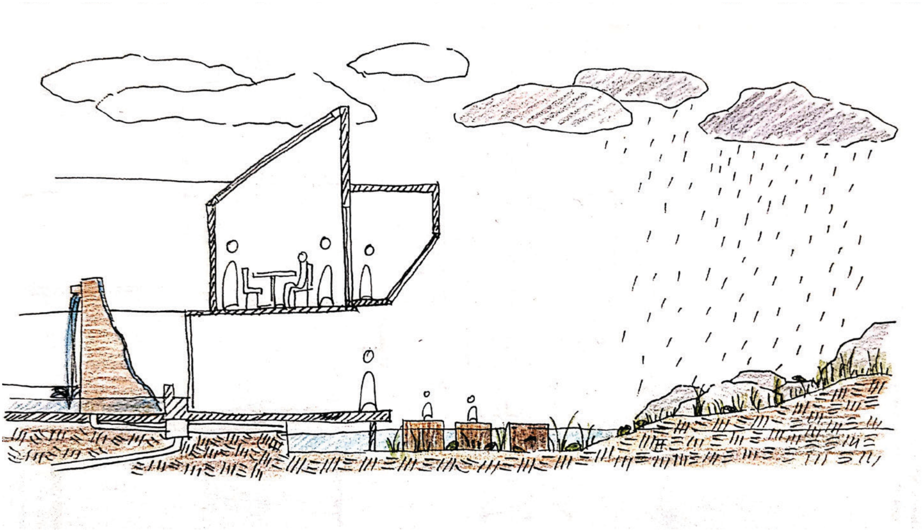


Fig. 3.1. Nicole Ren, *Sketch entrance of North Entrance*, 2020.

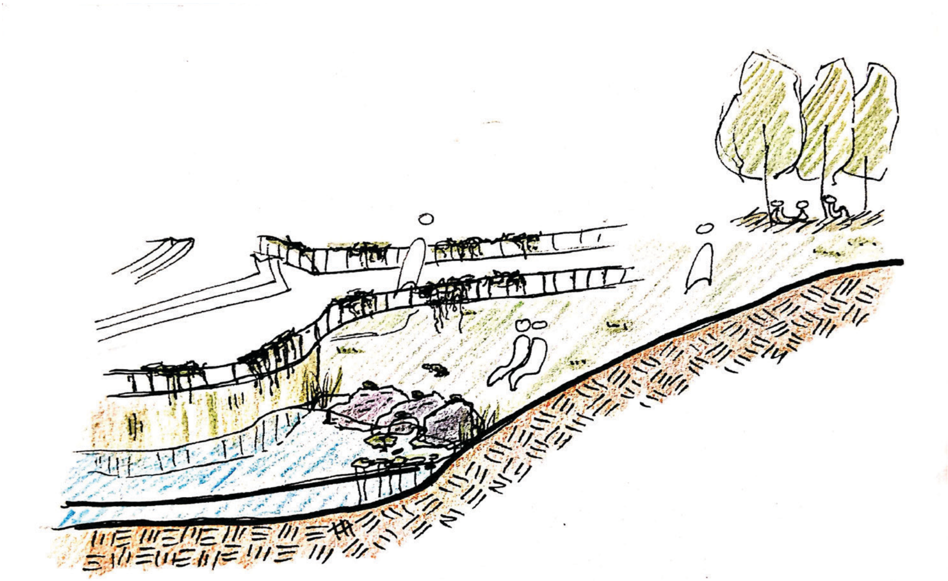
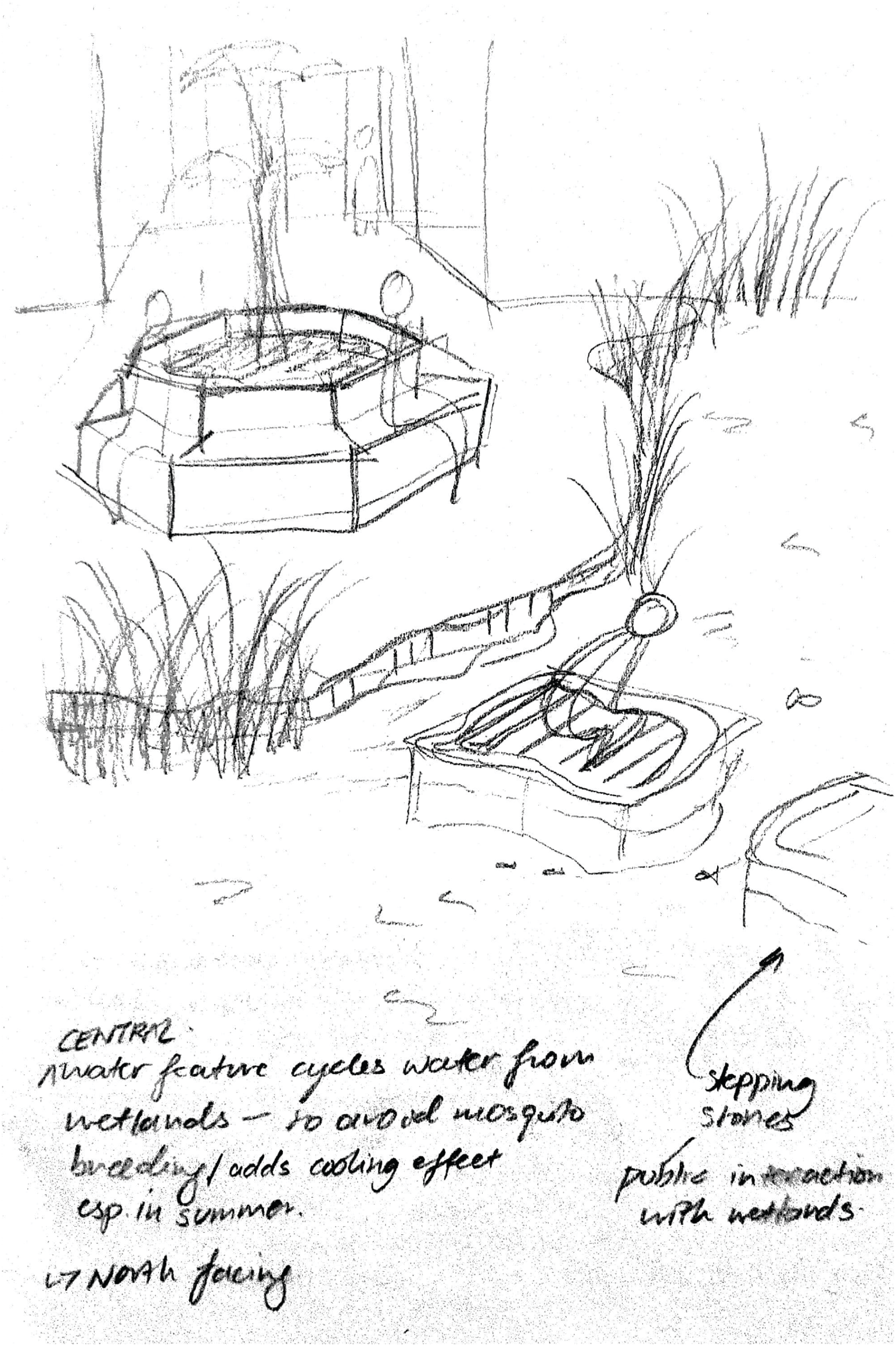


Fig. 3.2. Nicole Ren, *Sketch of Union Lawn pond*, 2020.



CENTRAL
water feature cycles water from wetlands – to avoid mosquito breeding / adds cooling effect esp. in summer.

↳ North facing

stepping stones

public interaction with wetlands.

Fig. 3.3. Nicole Ren, *Sketch of North Entrance*, 2020.

Building interventions will also consider the frogs preferences for areas for sunbathing, accessible ledges for hunting near nightlights, or hiding. Underground culverts, artificial shelters and shrubs on site will provide more intimate habitats and protection for the frogs against their predators.

Apart from wading through the water, frog islands in the middle of ponds will not be accessible to humans, except for researchers through the research lab (Figure 3.4).

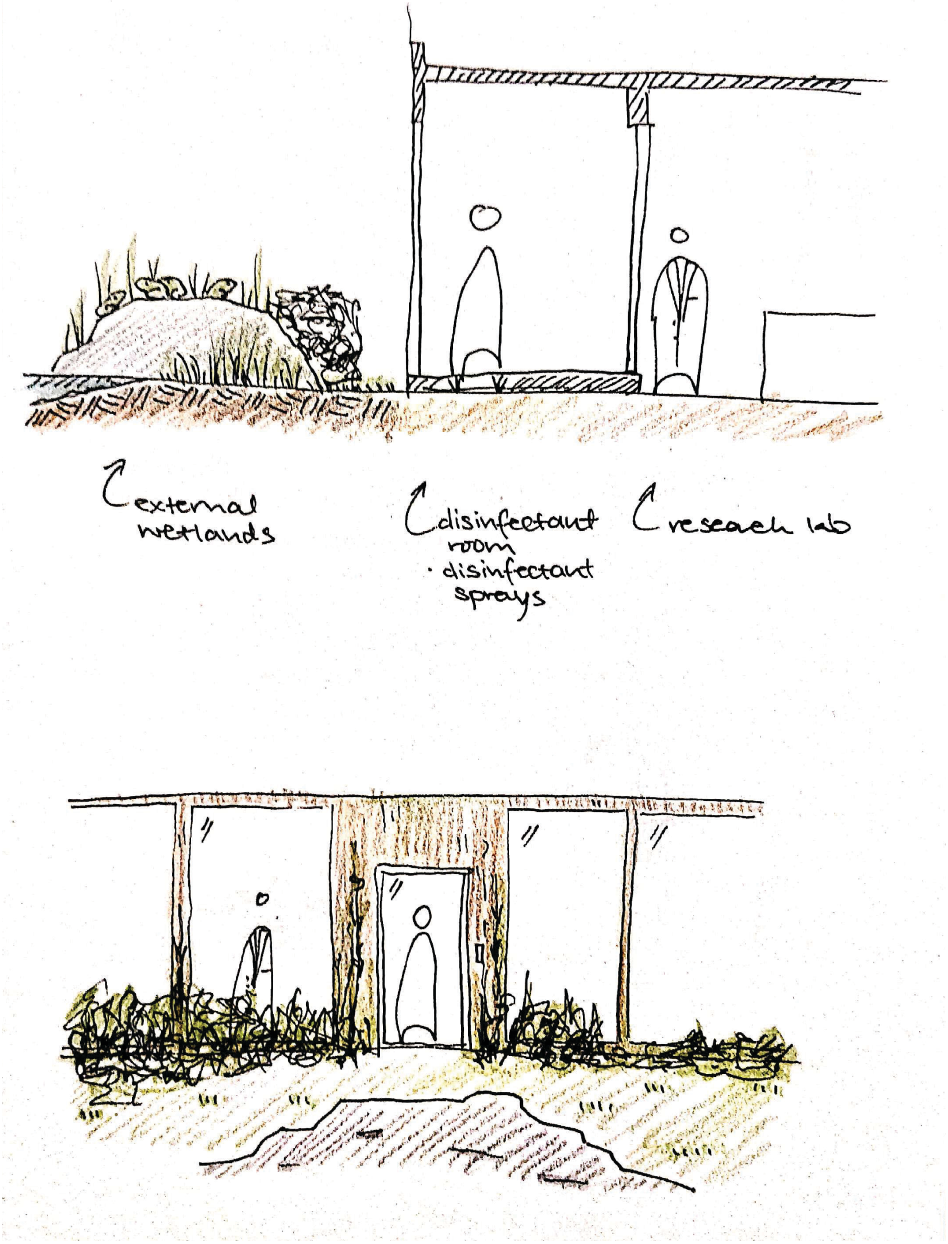


Fig. 3.4. Nicole Ren, *Sketch of researcher's access to wetlands*, 2020.

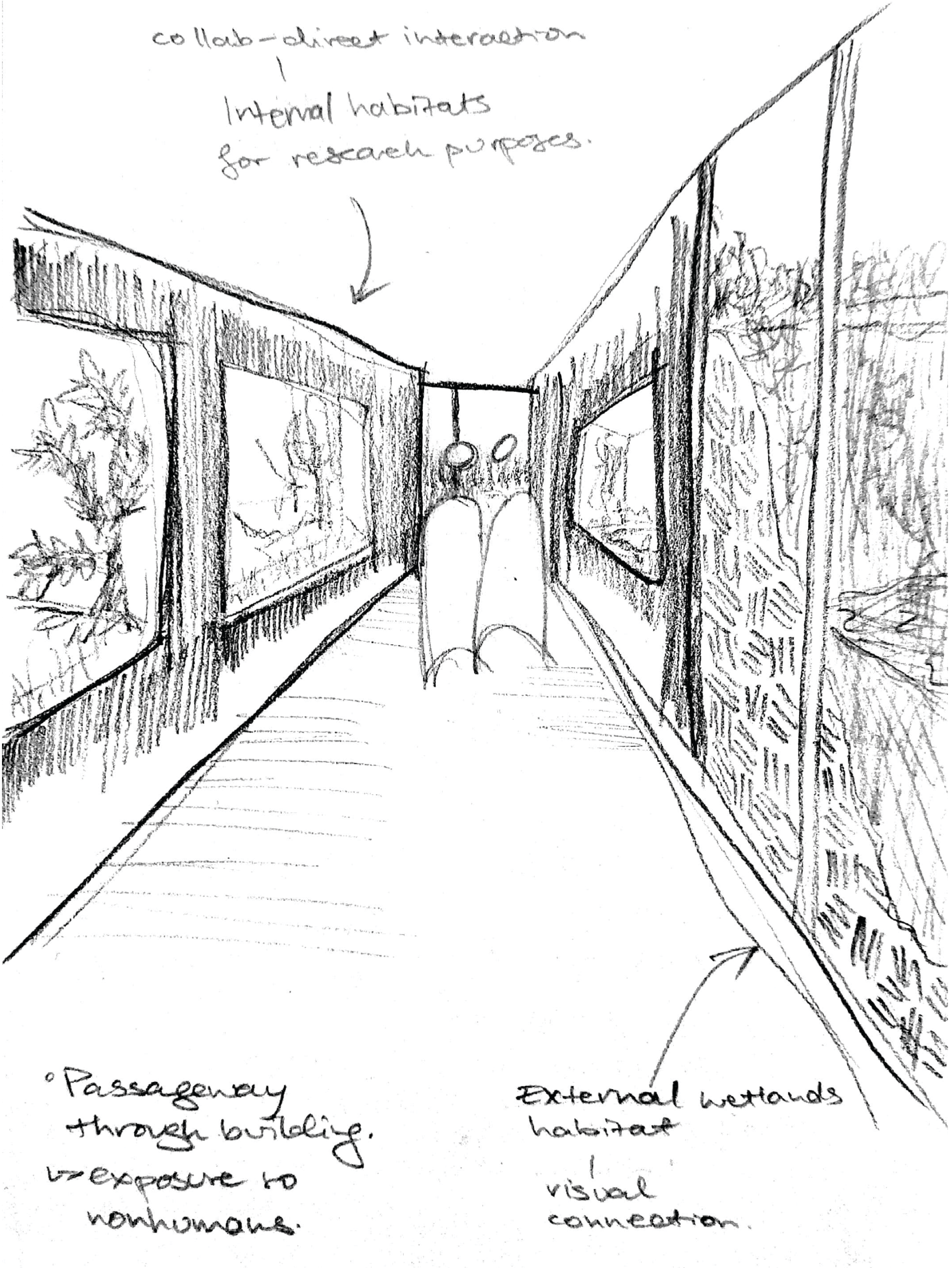


Fig. 3.5. Nicole Ren, *Sketch of internal circulation adjacent to research labs*, 2020.

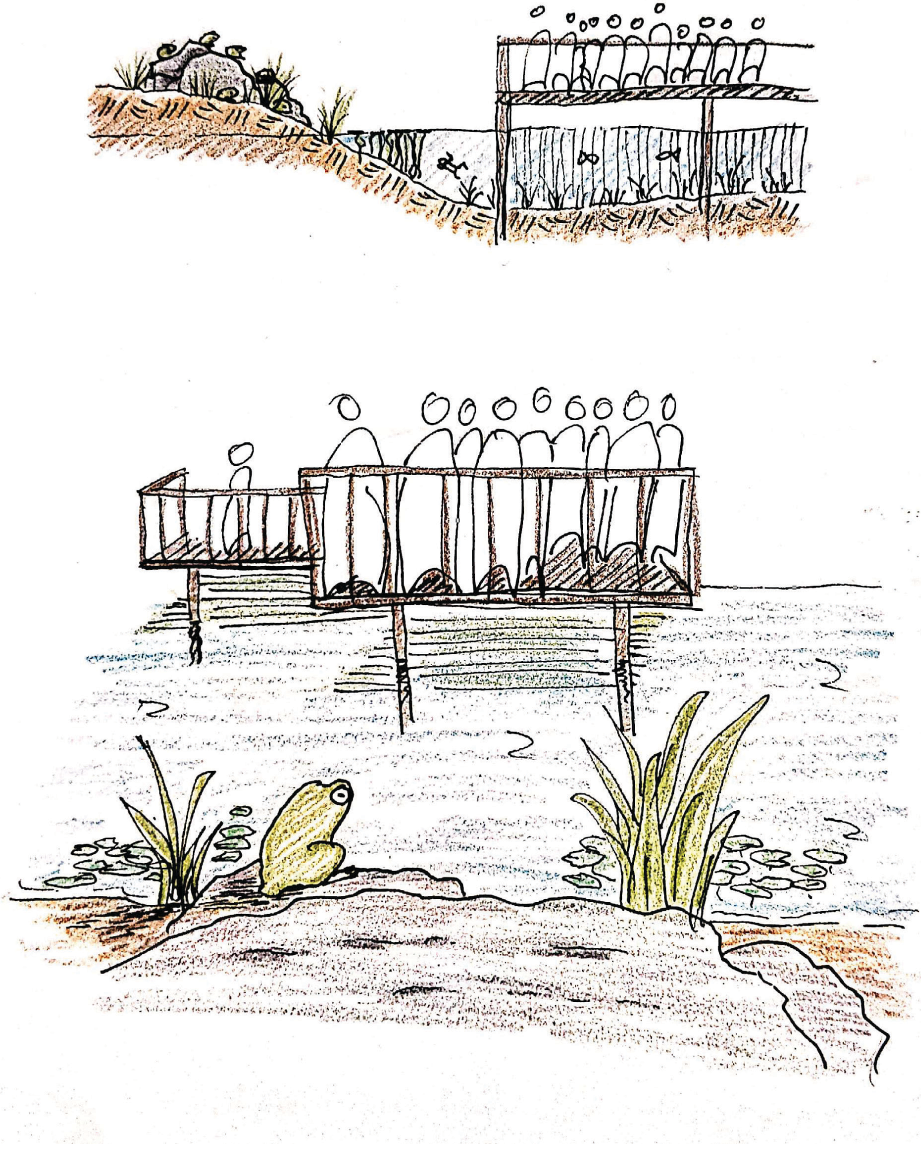


Fig. 3.6. Nicole Ren, *Sketch of external circulation_observation platforms*, 2020.

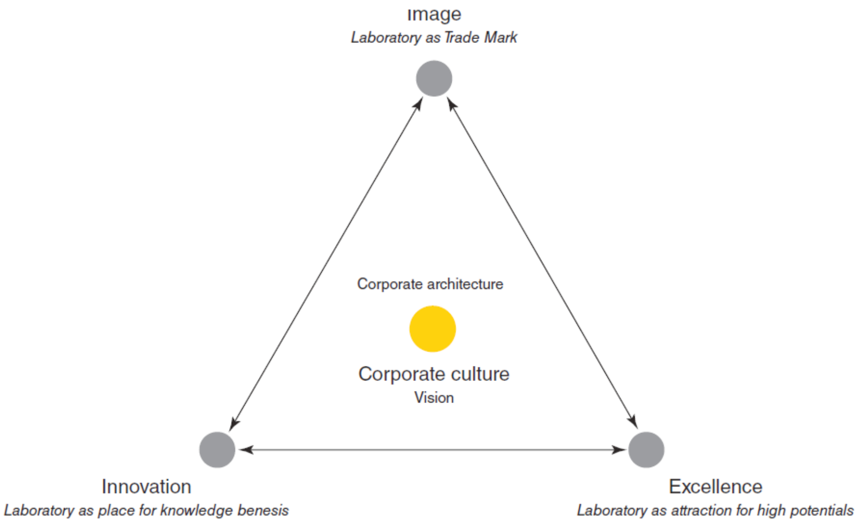


Fig. 4.1. Tobias Ell, *Corporate laboratory architecture*, 2020.

LABORATORIES

In relation to Ell's analysis of contemporary laboratories as symbolic of more than just science[1], hanging laboratories become a feature of a void, and designed cracks pique curiousity to peep into sealed spaces whilst living concrete's tendrils start to grow over the cracks.

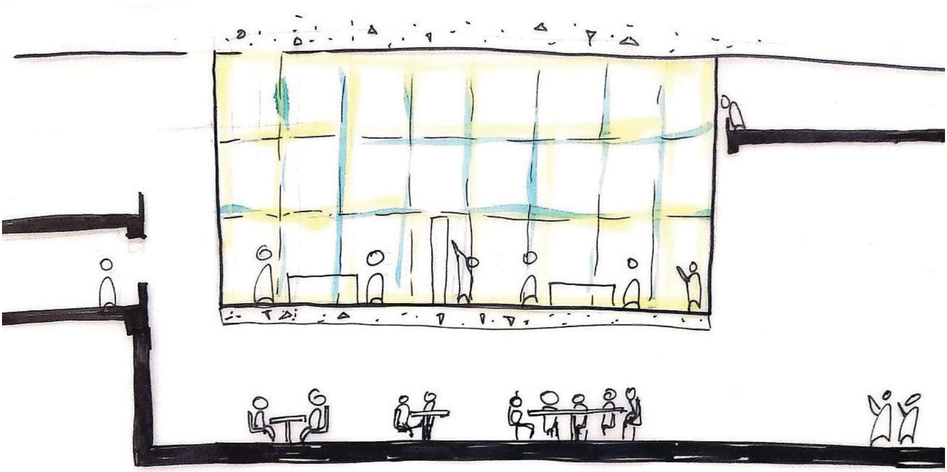


Fig.4.2. Nicole Ren, *Dented circulation that dips into research labs*, 2020.

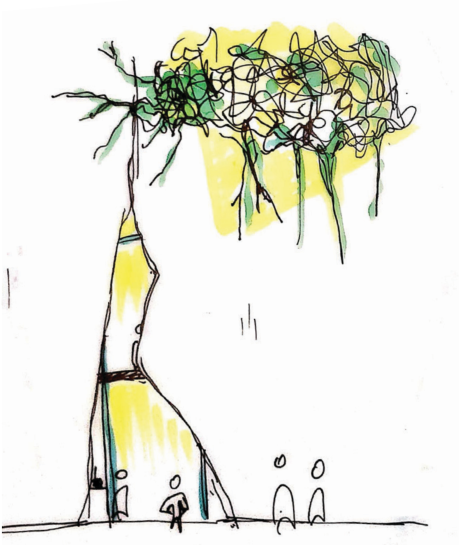


Fig. 4.3. Nicole Ren, *Internal facade cracks into PC2 laboratories with living concrete*, 2020.

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1. Tobias Ell, "Corporate Architecture – Architecture of Knowledge," in The Sustainable Laboratory Handbook: Design, Equipment, Operation, ed. Egbert Dittrich (Weinheim: Wiley-VCH, 2015), 37–41.

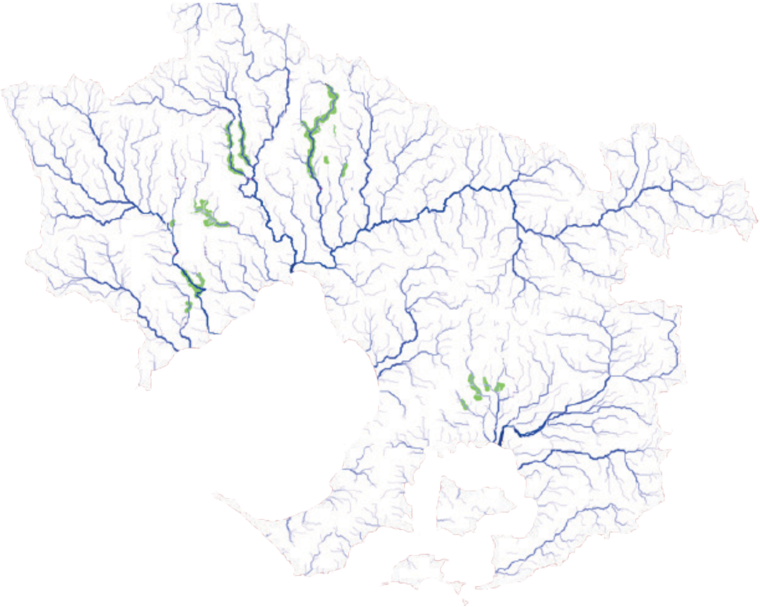


Fig. 5.1. Adapted from *GGF Masterplan for Melbourne's Growth Corridors*, *Map of GGF conservation areas*, 2020.

WATER AS DESIGN DRIVER

With water as a motif in the pre-existing wetlands and a key element in the ideal habitat for frogs, this led to a previous inclination towards the idea of a moat in a university campus, and so water becomes the main protagonist of the site and a design factor. Looking at how water creates its form in nature, it is this Lichtenberg fractal figure that is not as curvilinear as usually associated with organic shapes.

This led to the discovery of fractals in nature, particularly in the leaves of plants, and this developed an irregular, angular geometric language for the project. Water can also be an agent in design, eroding away at surfaces creating deeper lakes, and smoothening rocks.

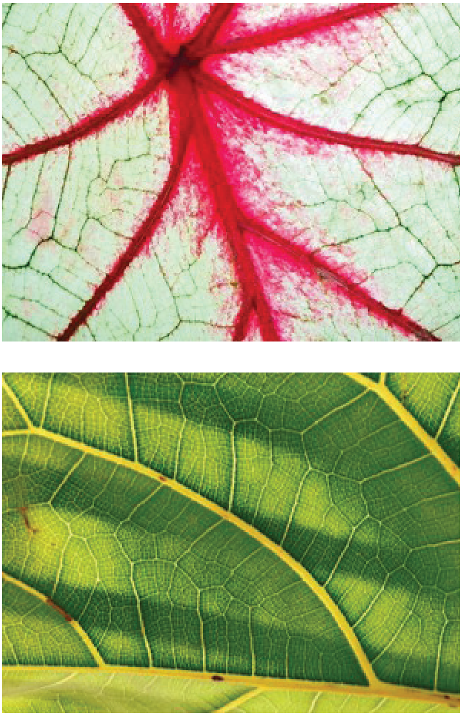


Fig. 5.2. Structures of a leaf, 2020.

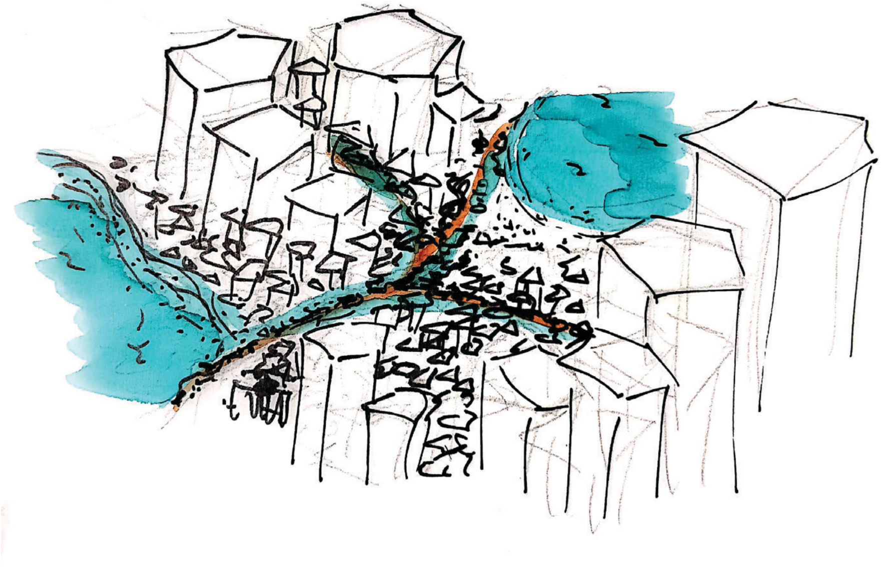


Fig. 5.3. Nicole Ren, *Sketch of building clusters with wetlands and rivers running through site*, 2020.

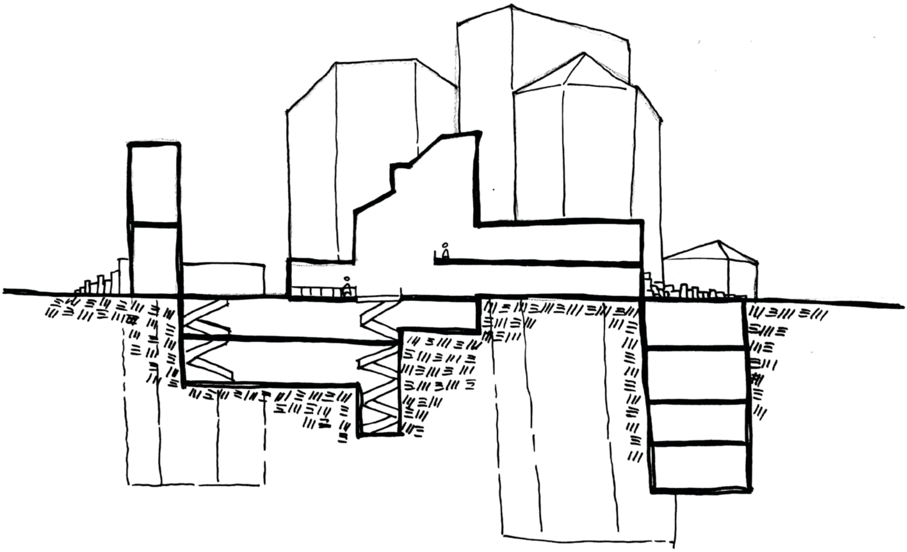


Fig. 5.4. Nicole Ren, *Section sketch showed massing's verticality*, 2020.

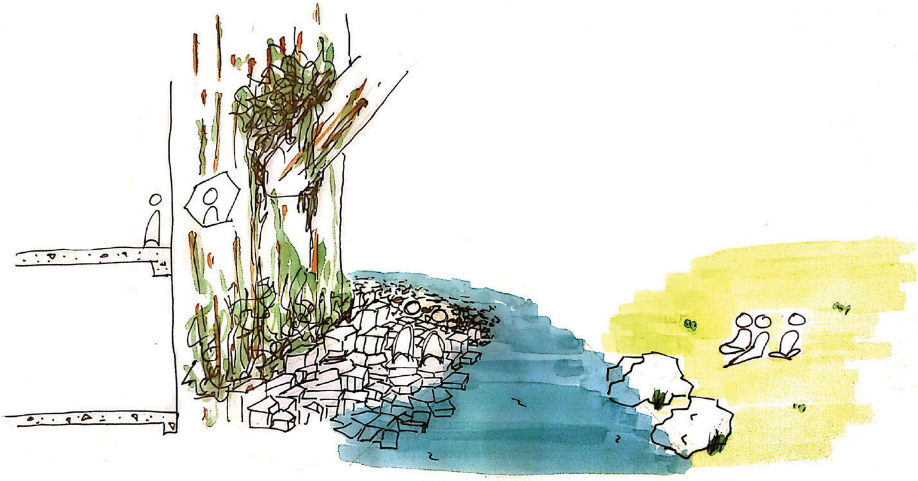


Fig. 5.5. Nicole Ren, *Perspective sketch of building and moat edge condition*, 2020.

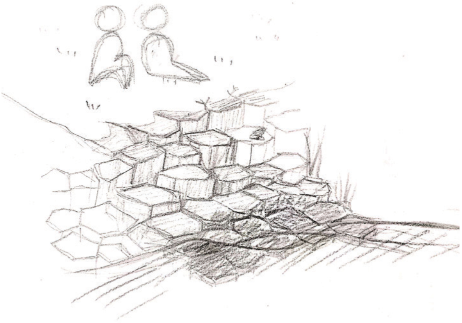


Fig. 5.6. Nicole Ren, *Sketch of stepping stones gradiating into the water*, 2020.

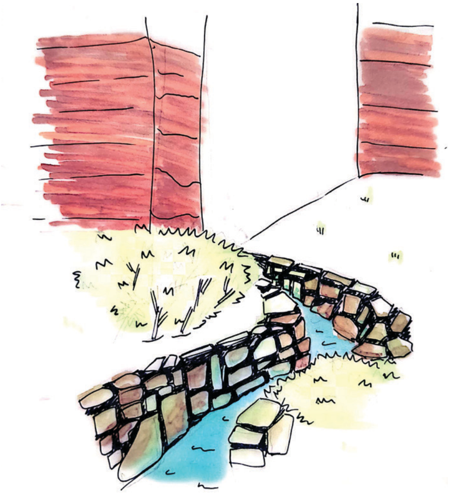


Fig. 5.7. Nicole Ren, *River running between buildings*, 2020.

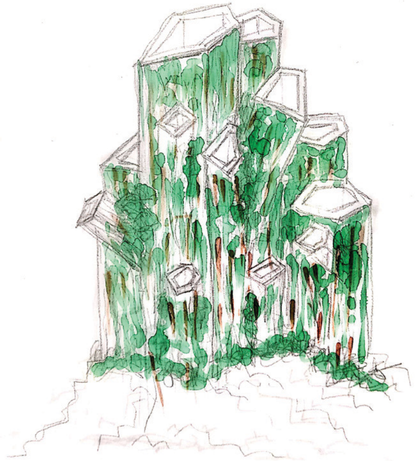


Fig. 5.8. Nicole Ren, *Light cannons and vegetation overgrowth*, 2020.

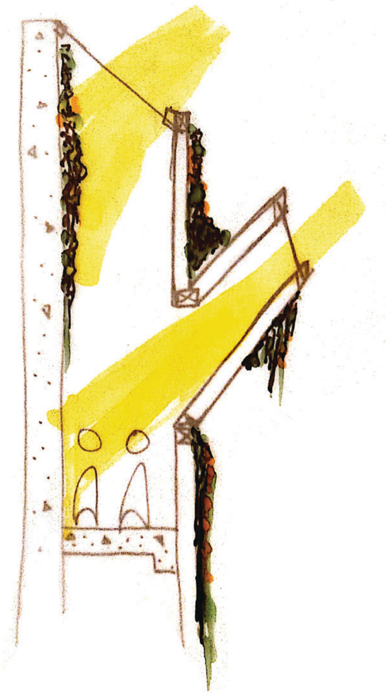


Fig. 5.9 Nicole Ren, *Initial sketch of light cannon*, 2020.

LIGHT CANNONS

Light cannons or light wells can be introduced to drive sunlight deep into the building. Drawing from fractals, these light cannons create crystal like formations on the façade.

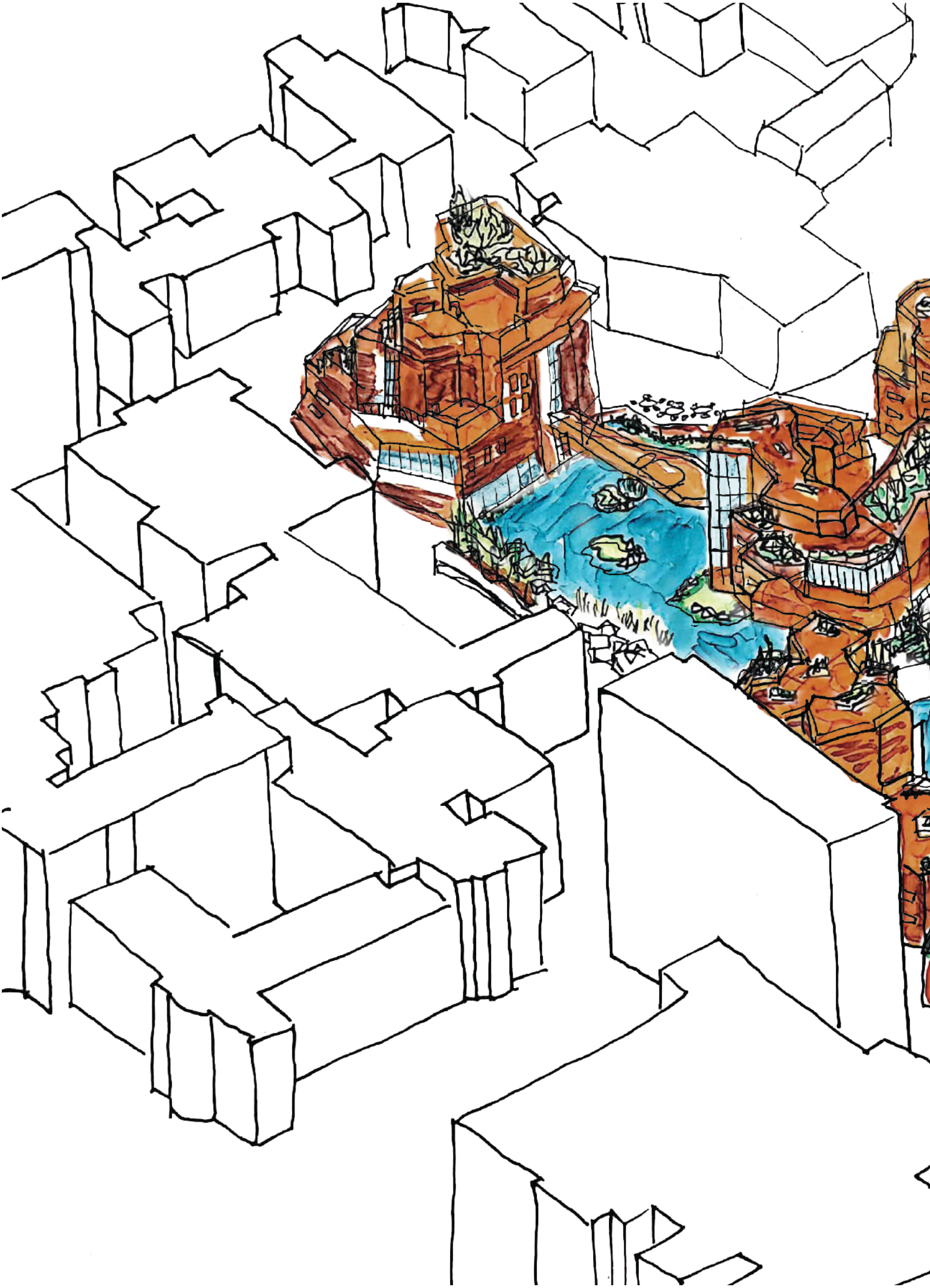
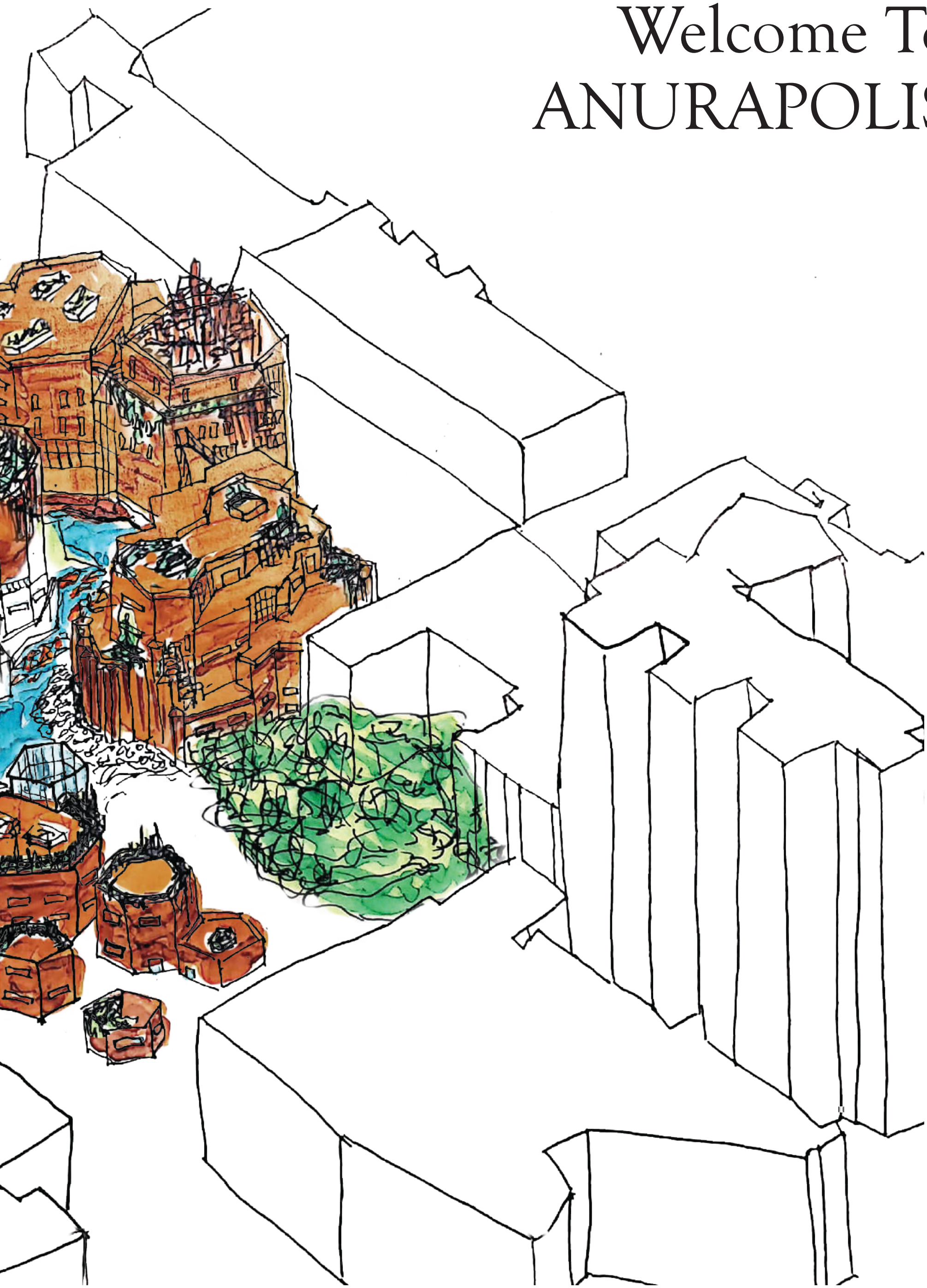


Fig. 6. Nicole Ren, *Axo drawing of Anurapolis*, 2020.

Welcome To
ANURAPOLIS



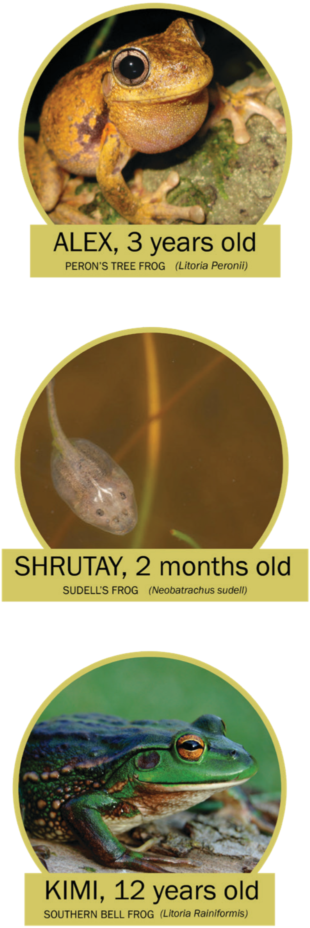

ALEX, 3 years old
PERON'S TREE FROG (*Litoria Peronii*)
SHRUTAY, 2 months old
SUDELL'S FROG (*Neobatrachus sudell*)
KIMI, 12 years old
SOUTHERN BELL FROG (*Litoria Rainiformis*)

Fig. 7.1. Nicole Ren, *Frog Clients*, 2020.

Clients

With amphibious frogs being the main client of Anurapolis, the different characteristics of personas Kimi, Shrutay, and Alex (sunbathing, burrowing, and climbing respectively) helped inform the design to give the Growling Grounds, Sudell's Subway, and Peronii's Platform.

Necessary features of an anti-chytrid pond were also regarded for the health and wellbeing of the amphibian clients, and will form one of the terrains found in the lake.

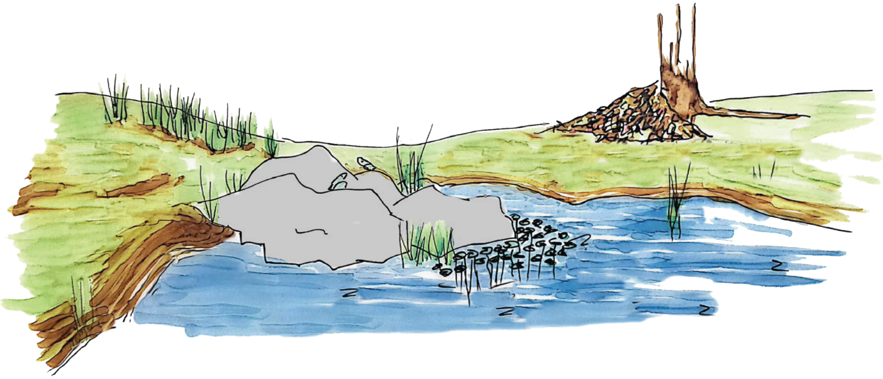
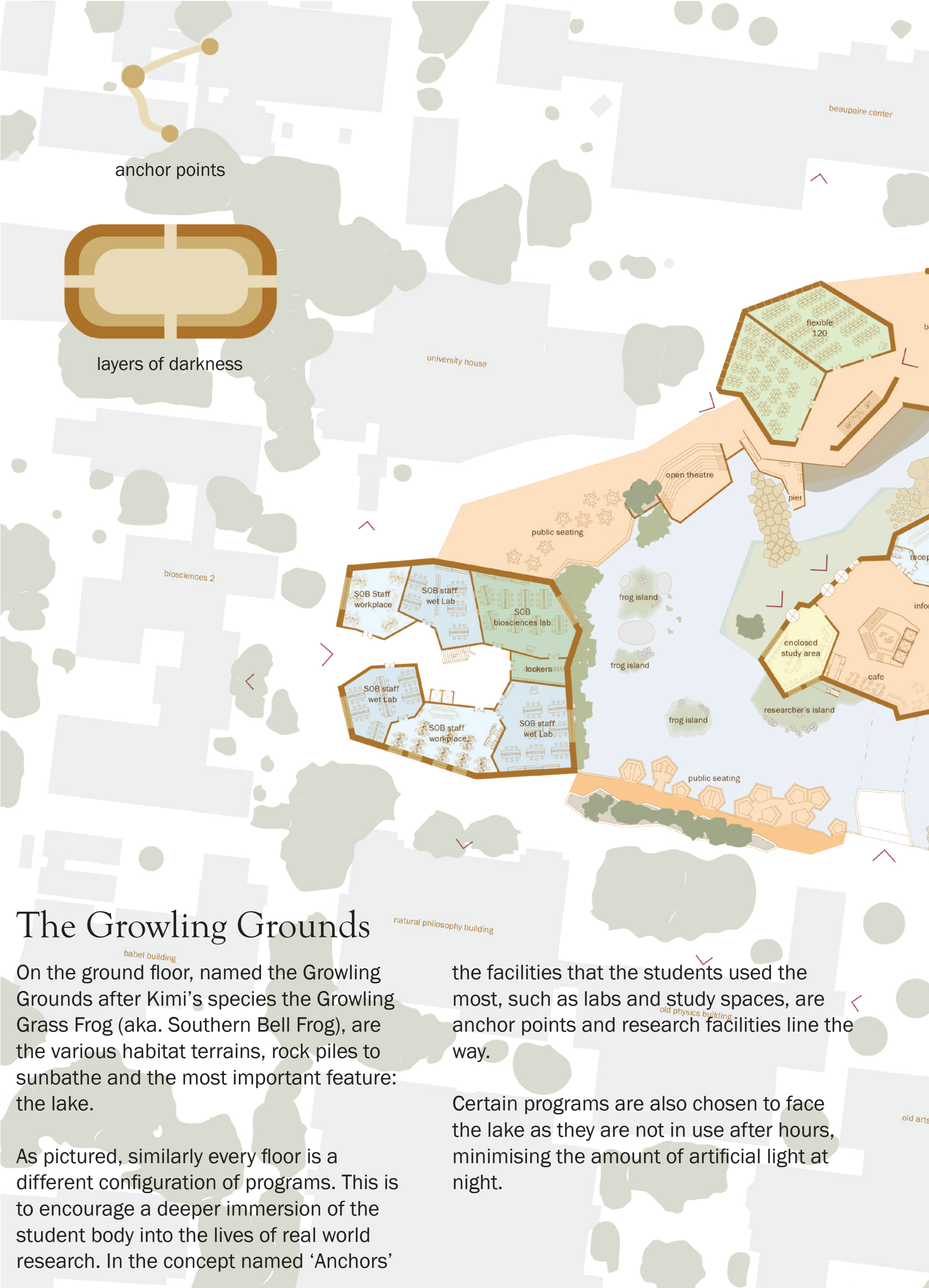


Fig.7.2. Nicole Ren, *Anti-Chytrid Pond*, 2020.

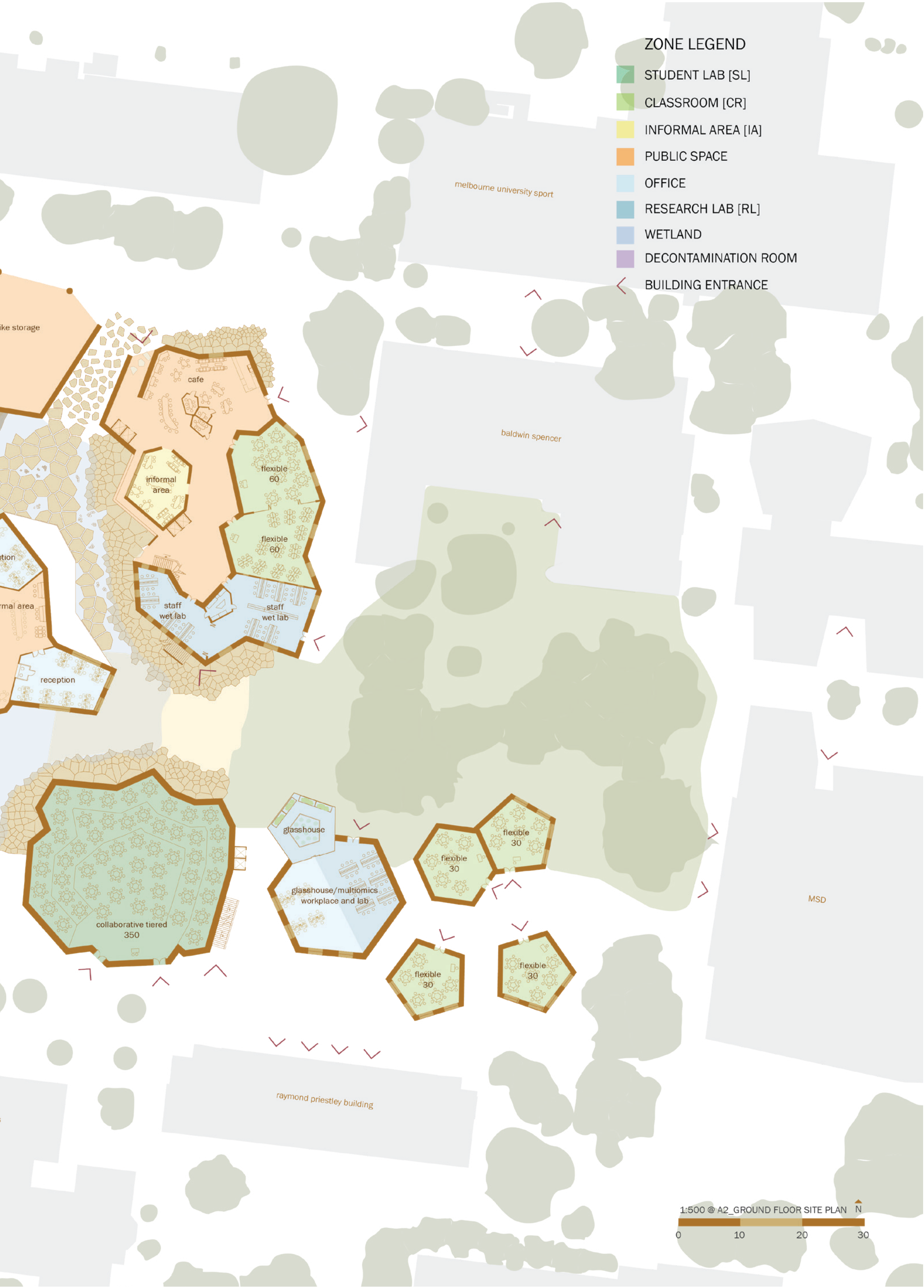


The Growling Grounds

On the ground floor, named the Growling Grounds after Kimi's species the Growling Grass Frog (aka. Southern Bell Frog), are the various habitat terrains, rock piles to sunbathe and the most important feature: the lake.

As pictured, similarly every floor is a different configuration of programs. This is to encourage a deeper immersion of the student body into the lives of real world research. In the concept named 'Anchors' the facilities that the students used the most, such as labs and study spaces, are anchor points and research facilities line the way.

Certain programs are also chosen to face the lake as they are not in use after hours, minimising the amount of artificial light at night.



1:500 @ A2_GROUND FLOOR SITE PLAN

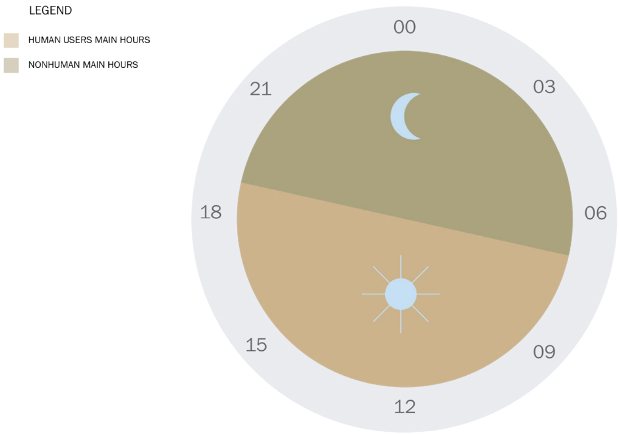


Fig. 8.1. Different hours of the day will have different humans and nonhuman users

Times of Use & Terrains

Different users during different hours of the day are accounted for, most of the ground is open to nature and for nonhumans to potentially run through the site when no humans are around. This means after-hours the site is returned to the nonhumans where a large percentage of them are nocturnal creatures. At roughly dawn the site is then reoccupied by humans (Figure 8.1).

Likewise, as in Figure 8.2, in considering the different users at different months of the year, students are not always around the university. Their semesters are cross referenced with the monthly mean rainfall and the seasons of the Kulin people, the original owners of the land, to crucially indicate that Poorneet or Tadpole Season is during semester and a rainy month, so a safe and protected habitat is essential for our frogs whilst still providing the humans at Unimelb somewhere to learn and relax.

At the lake, there are 7 different terrains to represent the 7 seasons (Figure 8.3), to aid in the research process of nonhumans and their habitat preferences, where the Poorneet season residing in the deepest area contains the frog islands, mangroves and water ferns to help increase the chances of successful breeding and their survival.

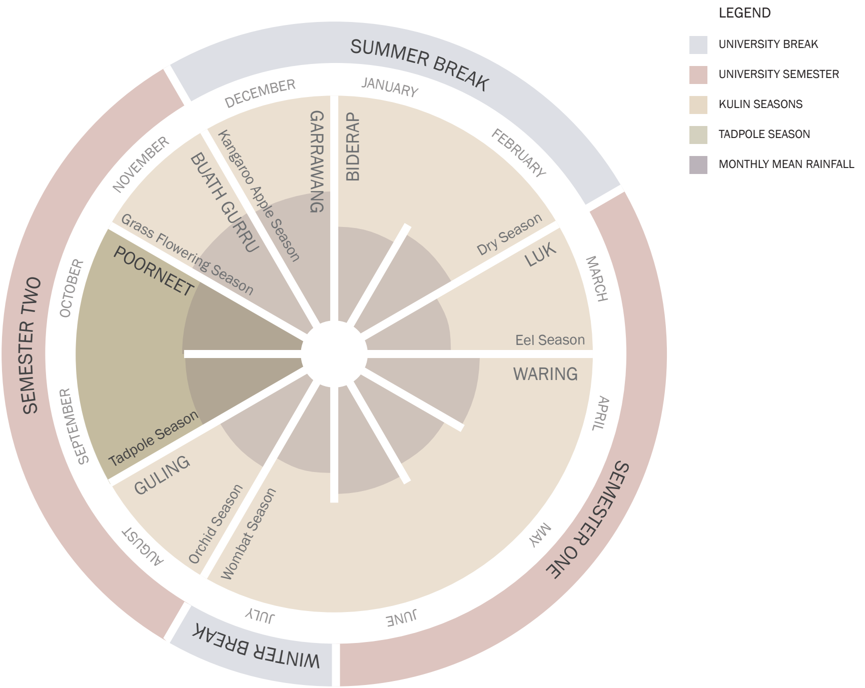


Fig. 8.2. Diagram of the 7 Kulin seasons and university semesters and monthly average rainfall

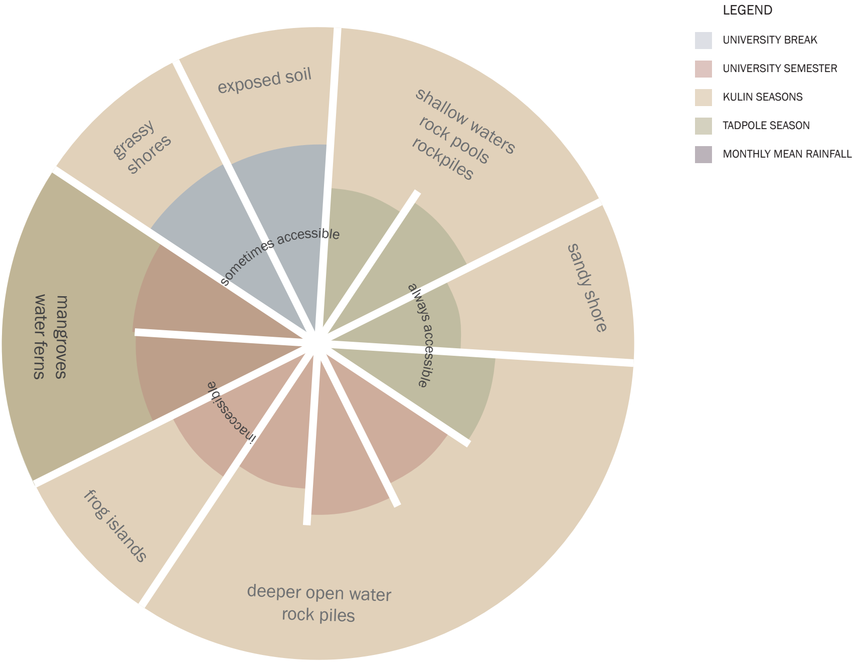


Fig. 8.3. Diagram of the 7 terrains and average rainfall

Levels of Accessibility

Additionally, to increase chances of survival and nonhuman autonomy, the lake is sectioned into 3 levels of accessibilities with regards to the average amount of rainfall each month some areas accessibility depends on the water level (Figure 9).

At normal water height, roughly half of the lake is inaccessible, and given to the nonhumans to live comfortably and freely, with the exception of Researcher's island which is directly connected to their underground research facility and has complete access all year round. Whilst in higher rainfall seasons, from September (Poorneet) to December (when the tadpoles are still maturing), the stepping stones from the pier will be submerged, cutting off the breeding grounds from human interference.

Water accessibility is also crucial for the survival of all living beings. The sandy shore on the east provides a slow sloping bank to allow other nonhumans access to a fresh water source.

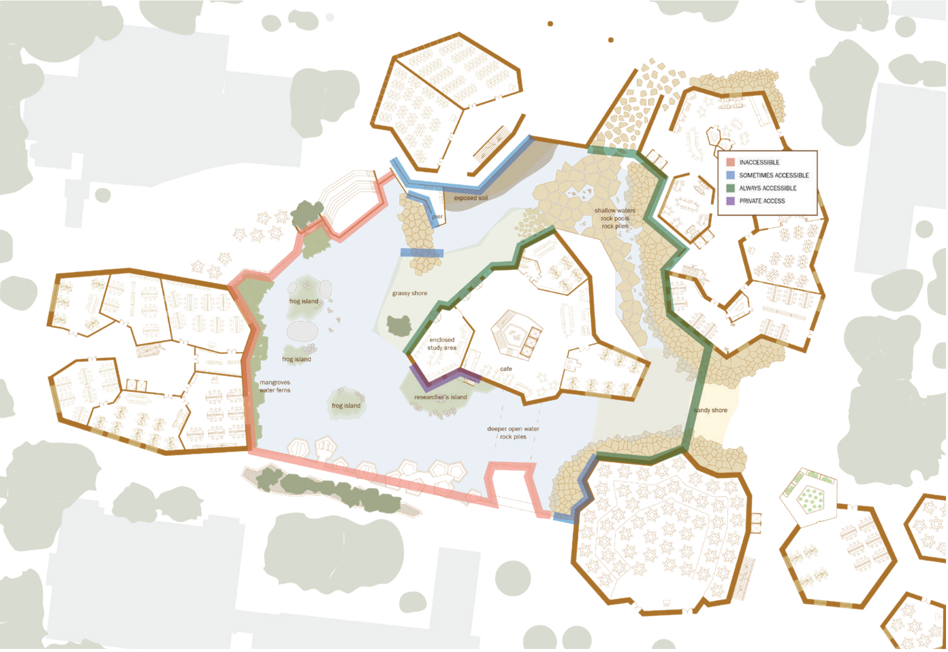


Fig. 9. Site accessibility based on rainfall and terrains

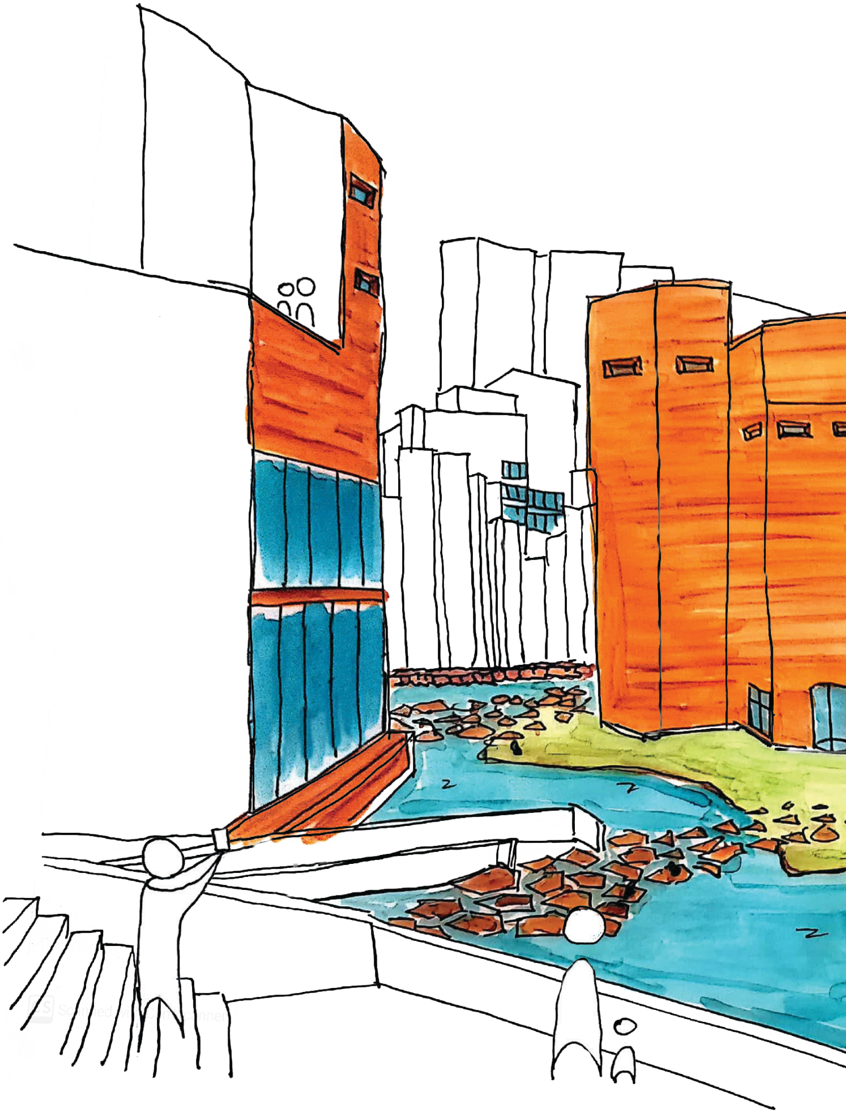


Fig. 10. View from the open theatre
During the months of heaviest rainfall (Sep-Dec), also breeding season, the stepping stones to the central island are submerged, cutting off half the lake. Shallower waters with rock pools and boulders will still be accessible.

This lake will also become an additional stop in the Billebellary Walk of campus, leading from the Red River Gums and following the original flow of the Bouverie Creek towards Anurapolis. It will be a signifier of the importance of the waterbody to the survival of the Wurundjeri people who used the lake to capture eels and harvest vegetation.

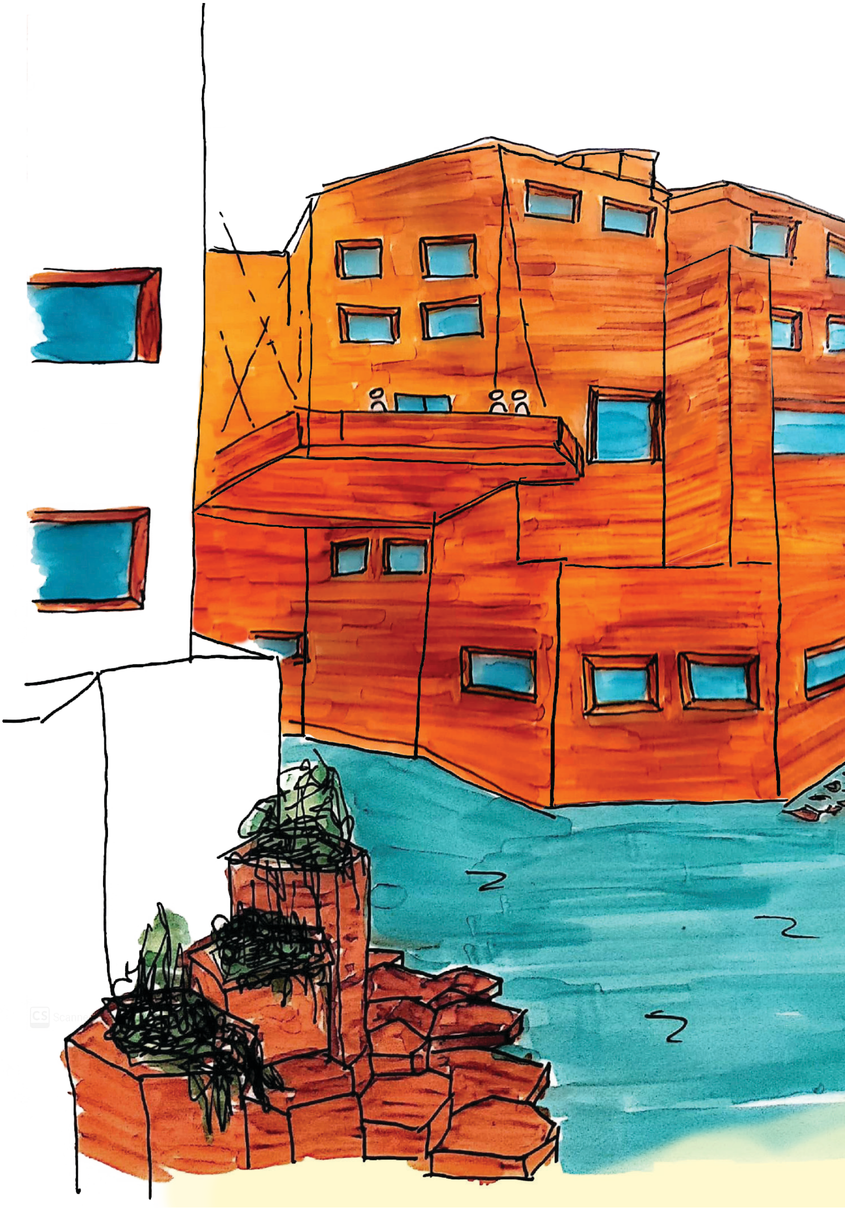
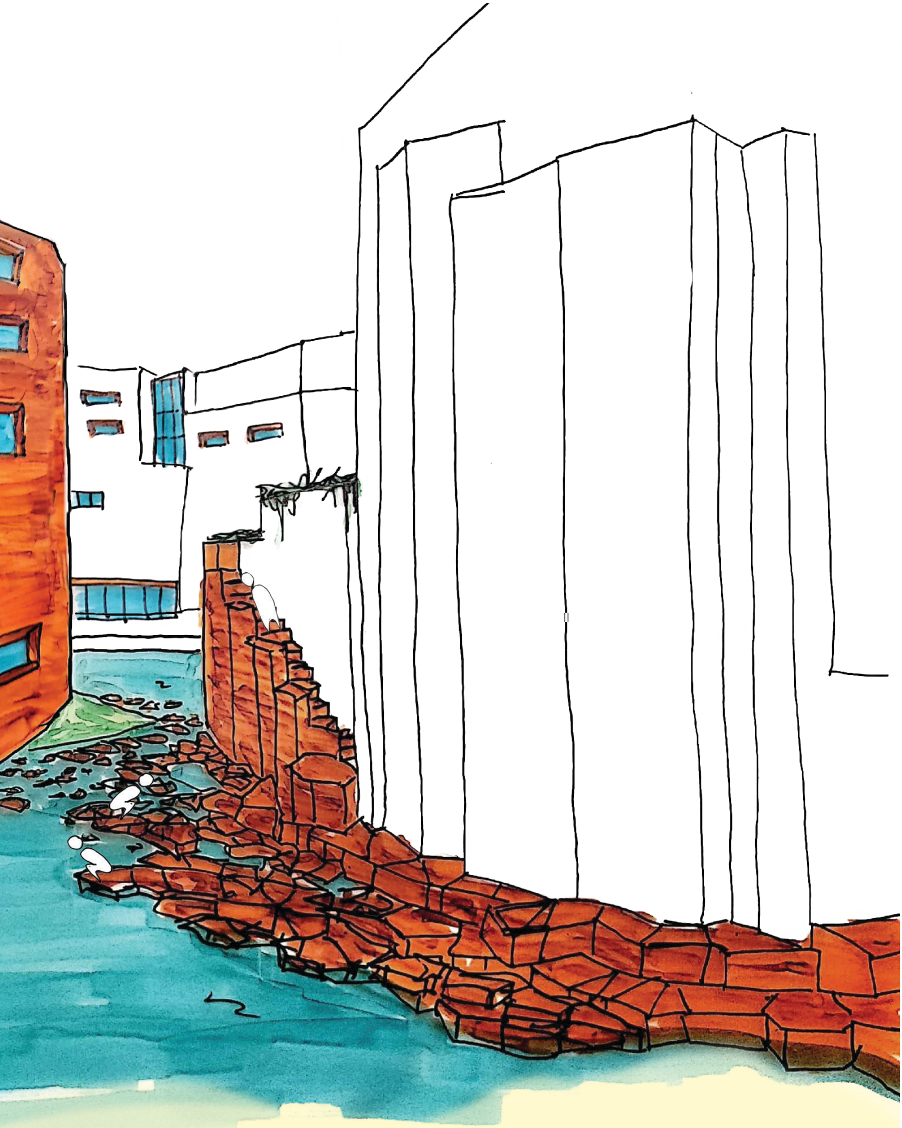
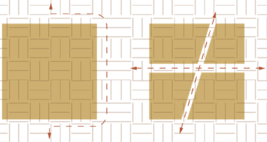


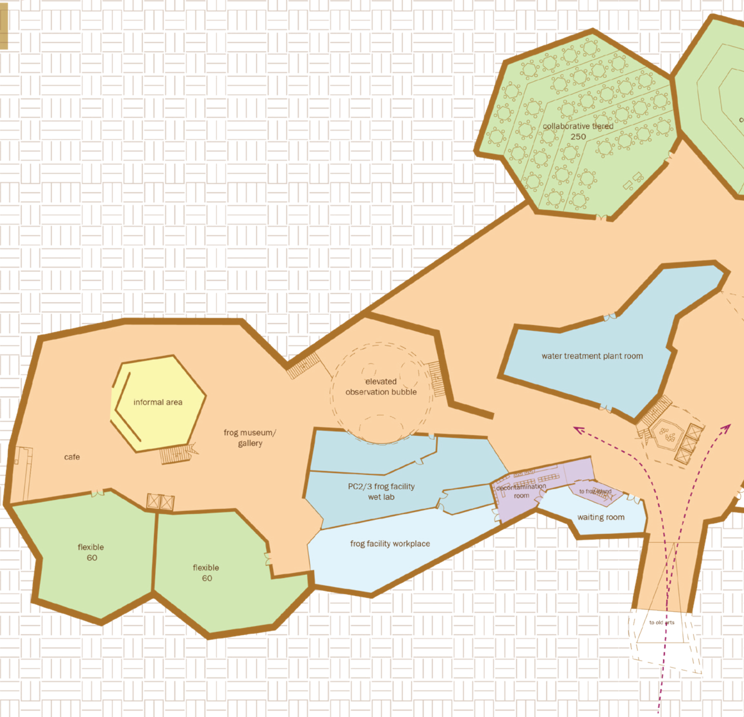
Fig. 11. View from old Union Lawn
The sandy shore provides easy access to the water's edge for nonhumans whilst rocky earthy boulders line the sides of buildings. During warmer weather, groups of humans can be seen frolicking in the waters or sunbathing with the frogs.



anchor points



shortcuts

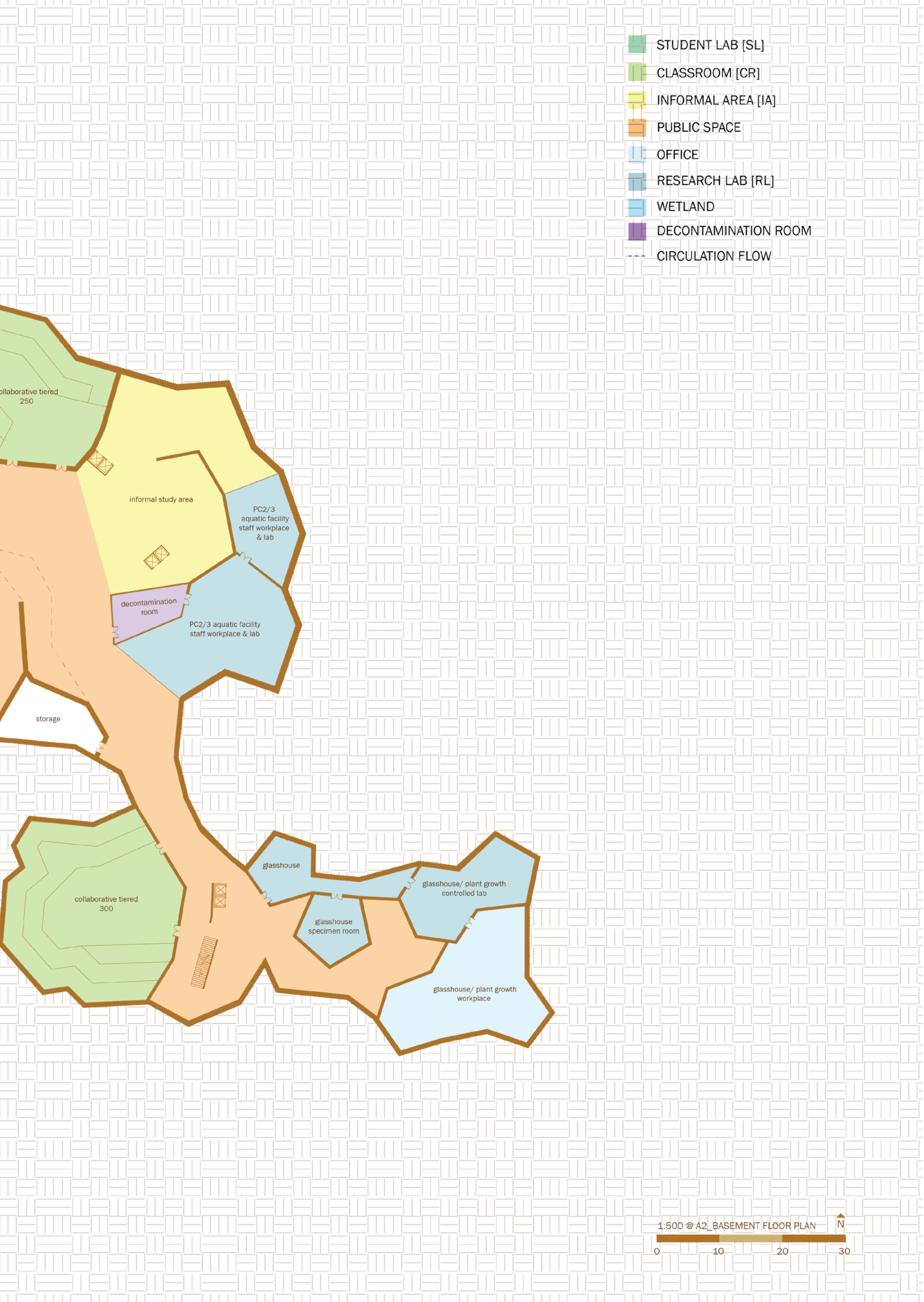


Sudell's Subway

Below the lake is Sudell's Subway, named after the burrowing frog, which interconnects all the buildings, offering shortcuts through the site. The forked passage of the main entrance pays homage to the original flow of the Bouverie Creek towards the Yarra River. Once again, alluding to the original lake of the Wurundjeri people.

Research programs are scattered between the larger classrooms and collaborative theatres that were placed underground to allow more flexibility in program placement above.

All things frog are located here too, with an observation bubble and museum/gallery adjacent to the research facility.


STUDENT LAB [SL]
CLASSROOM [CR]
INFORMAL AREA [IA]
PUBLIC SPACE
OFFICE
RESEARCH LAB [RL]
WETLAND
DECONTAMINATION ROOM
CIRCULATION FLOW
ollaborative tiered
250
informal study area
PC2/3
aquatic facility
staff workplace
& lab
decontamination
room
PC2/3 aquatic facility
staff workplace & lab
storage
collaborative tiered
300
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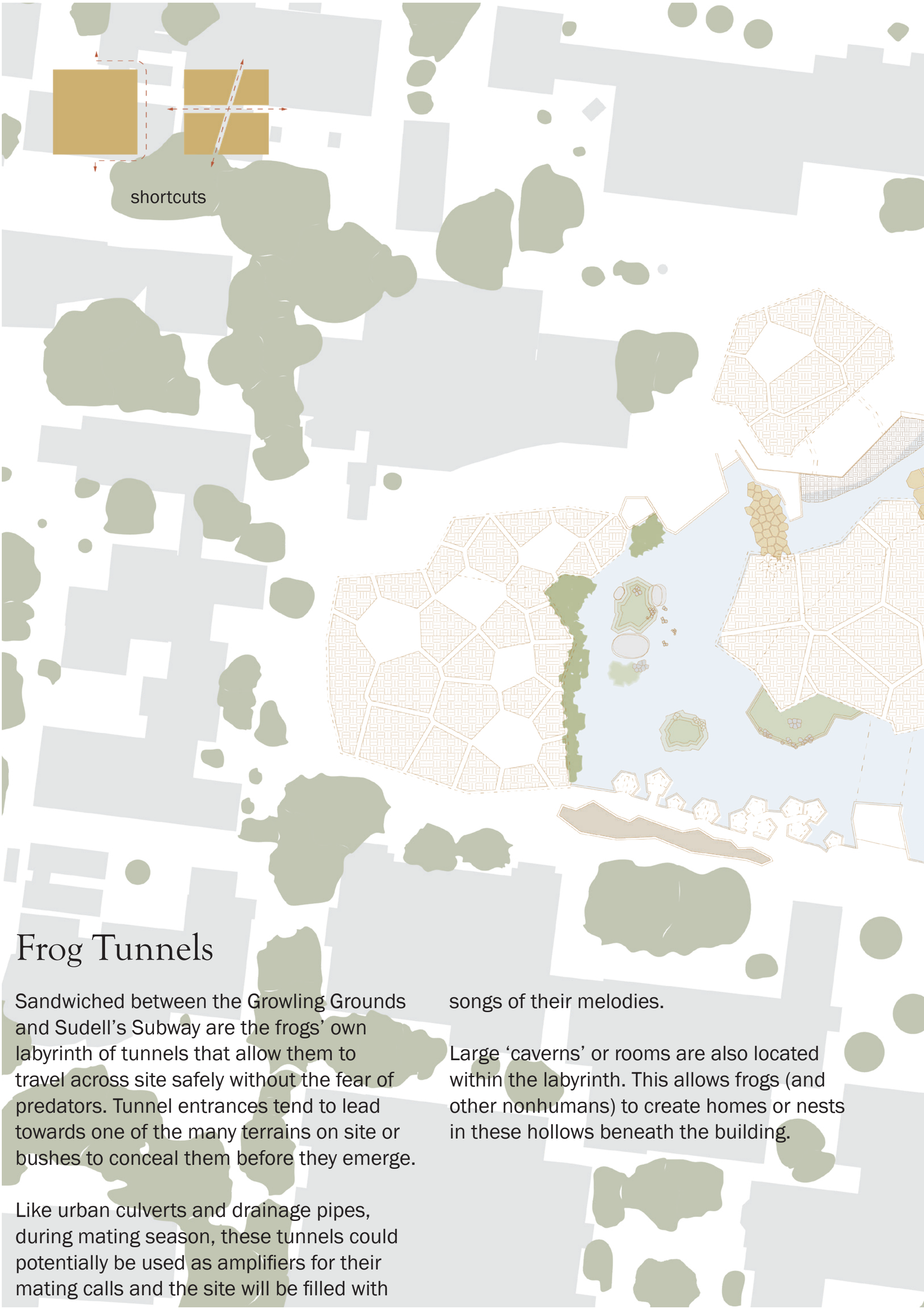


Frog Tunnels

Sandwiched between the Growling Grounds and Sudell's Subway are the frogs' own labyrinth of tunnels that allow them to travel across site safely without the fear of predators. Tunnel entrances tend to lead towards one of the many terrains on site or bushes to conceal them before they emerge.

Like urban culverts and drainage pipes, during mating season, these tunnels could potentially be used as amplifiers for their mating calls and the site will be filled with songs of their melodies.

Large 'caverns' or rooms are also located within the labyrinth. This allows frogs (and other nonhumans) to create homes or nests in these hollows beneath the building.

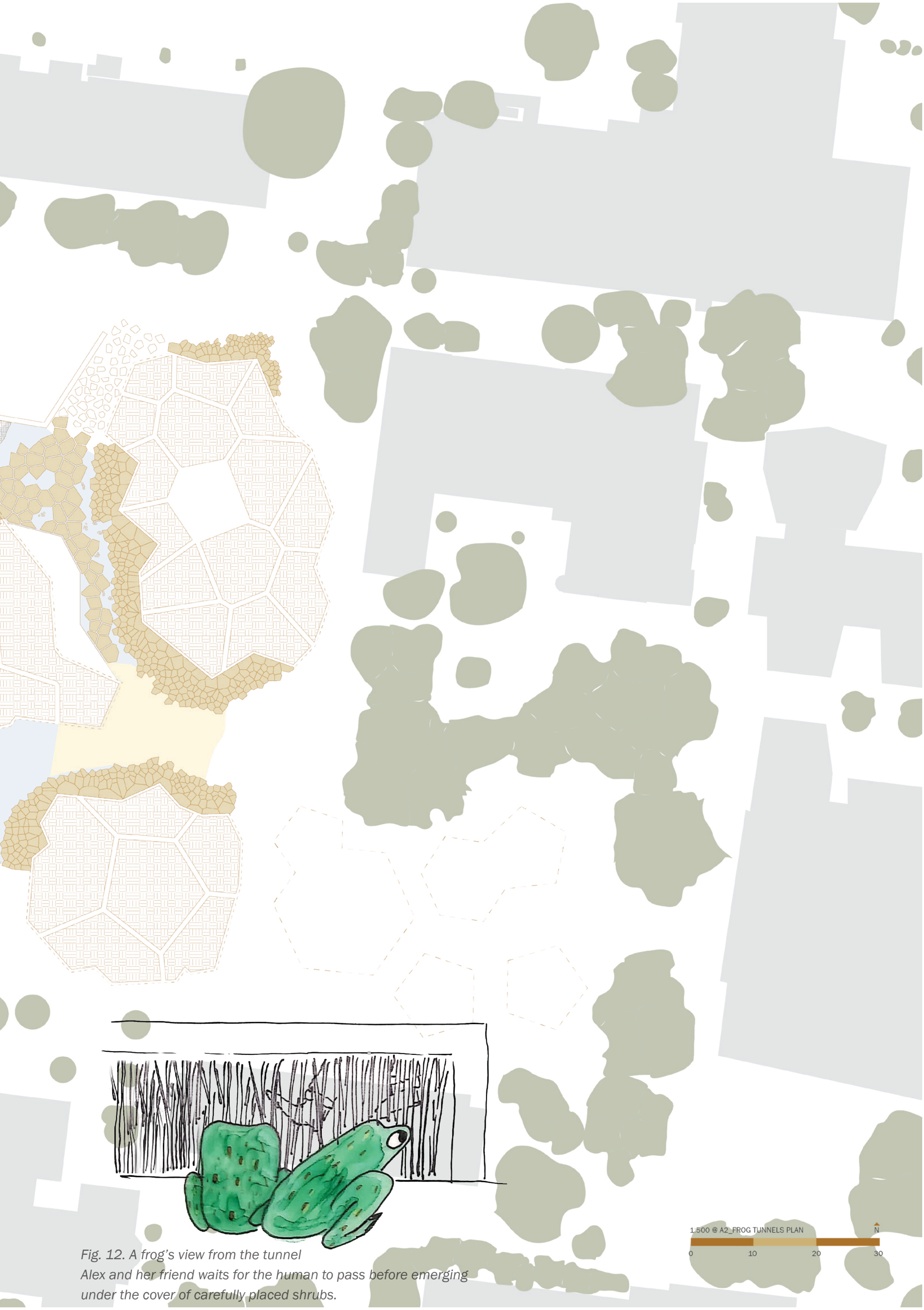
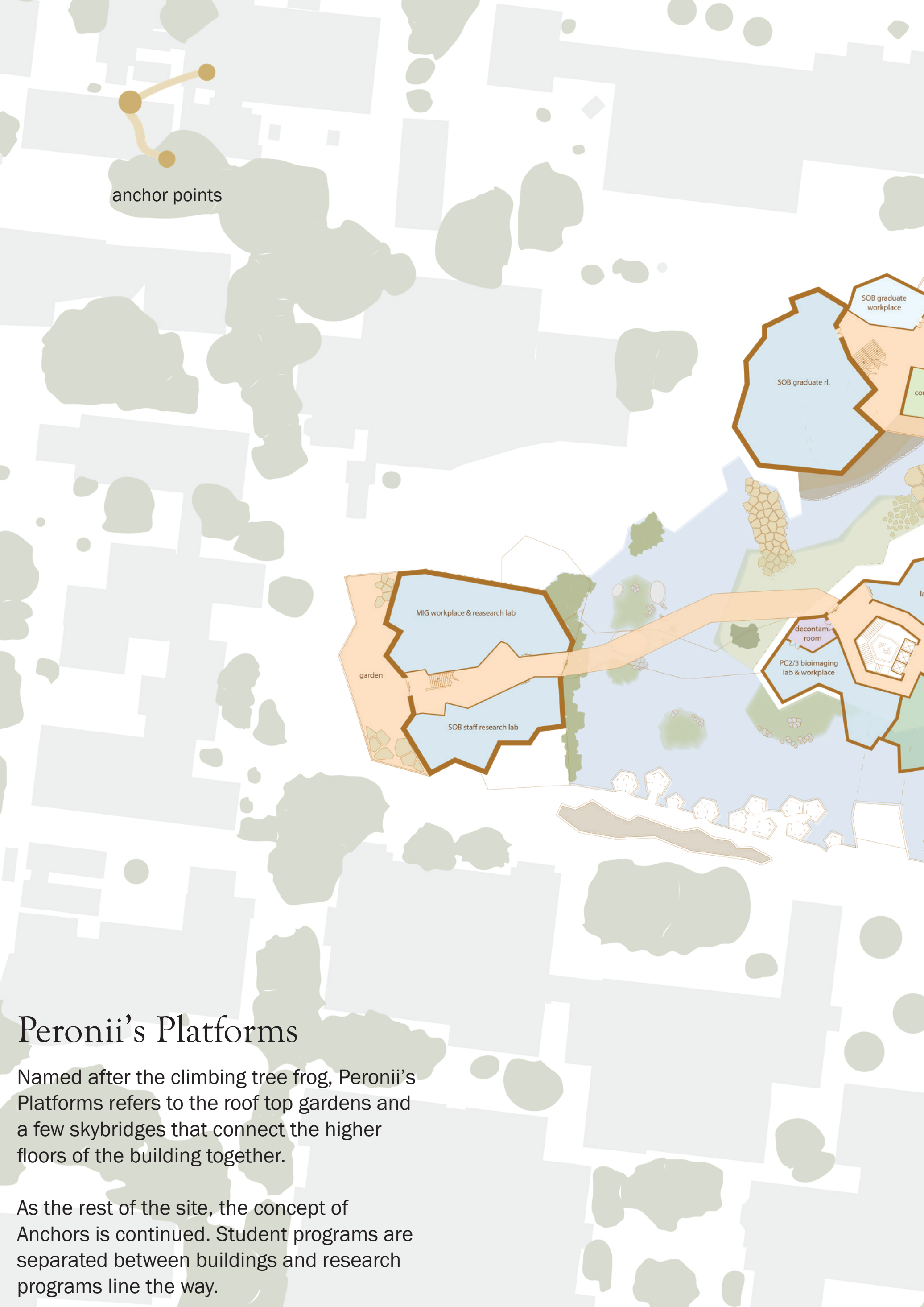


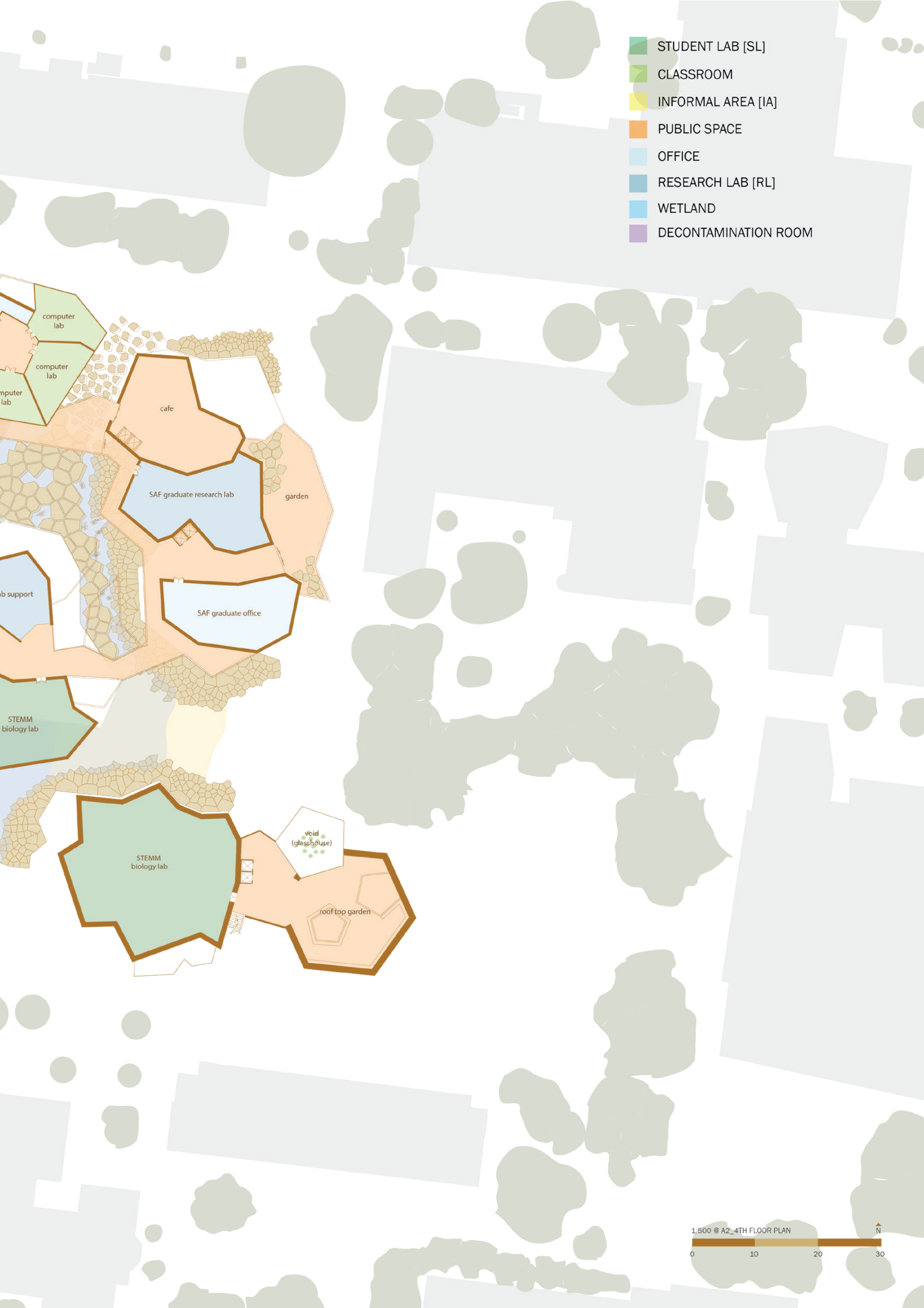
Fig. 12. A frog's view from the tunnel
Alex and her friend waits for the human to pass before emerging under the cover of carefully placed shrubs.



Peronii’s Platforms

Named after the climbing tree frog, Peronii’s Platforms refers to the roof top gardens and a few skybridges that connect the higher floors of the building together.

As the rest of the site, the concept of Anchors is continued. Student programs are separated between buildings and research programs line the way.


🟩 STUDENT LAB [SL]
🟩 CLASSROOM
🟨 INFORMAL AREA [IA]
🟧 PUBLIC SPACE
🟦 OFFICE
🟦 RESEARCH LAB [RL]
🟦 WETLAND
🟪 DECONTAMINATION ROOM
computer lab
computer lab
mputer lab
cafe
SAF graduate research lab
garden
b support
SAF graduate office
STEMM biology lab
STEMM biology lab
void (glasshouse)
roof top garden
1:500 @ A2_4TH FLOOR PLAN
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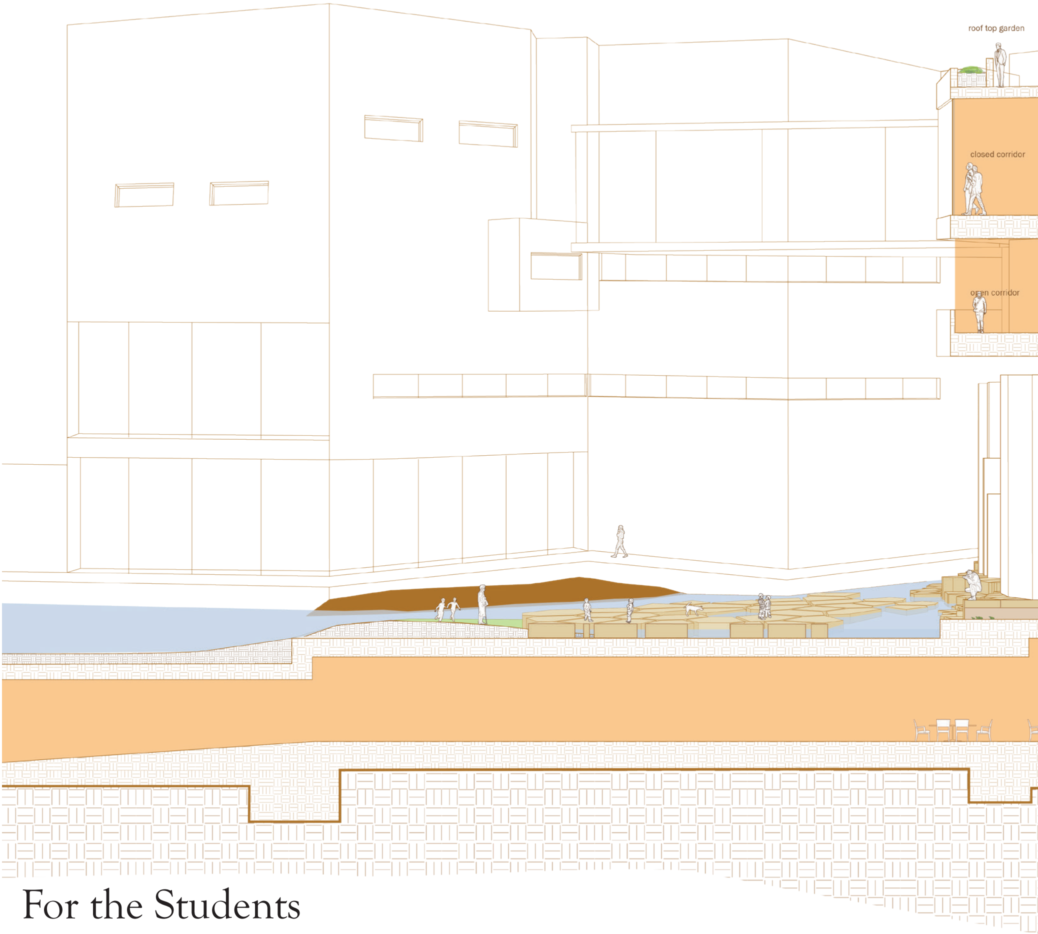
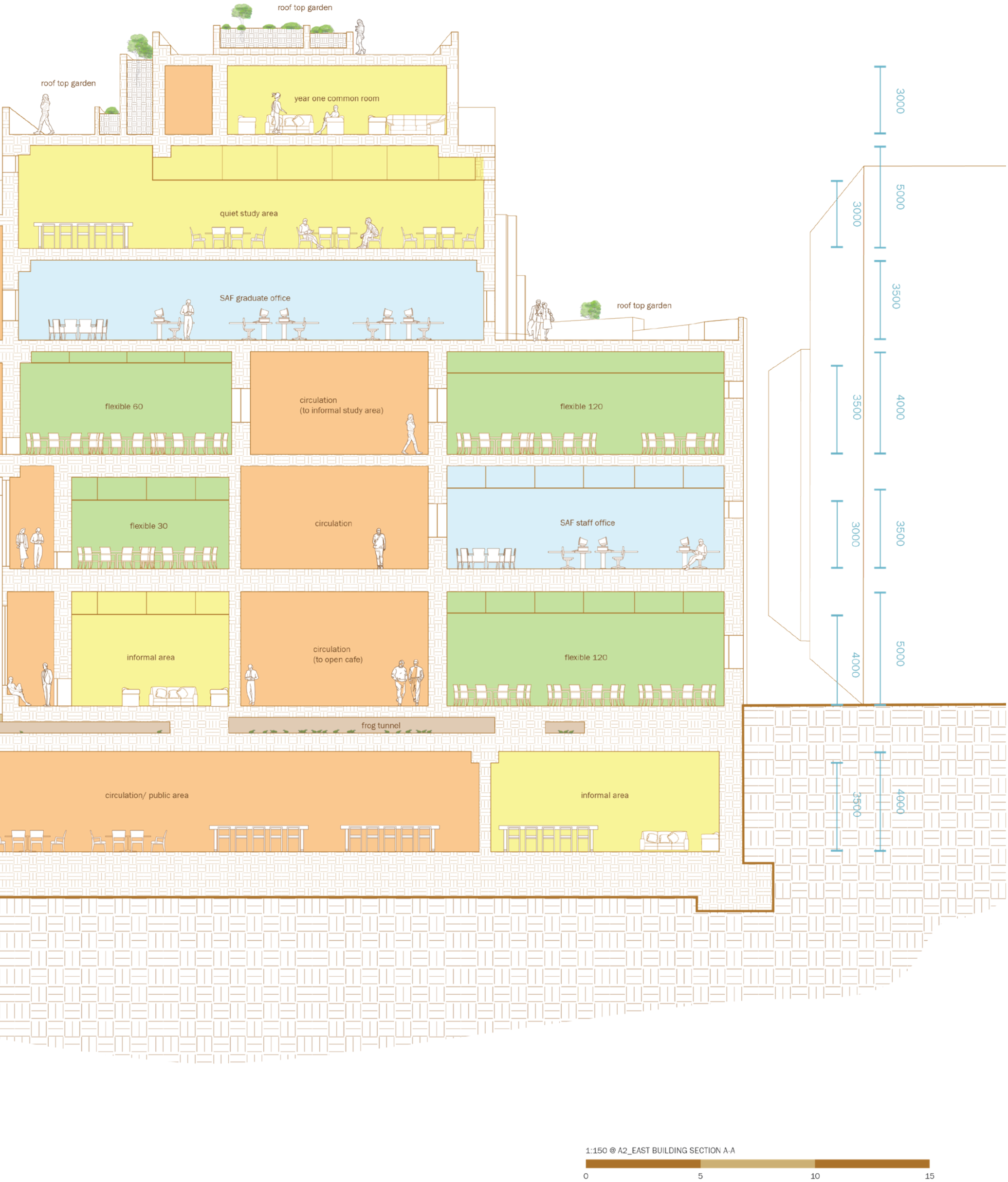
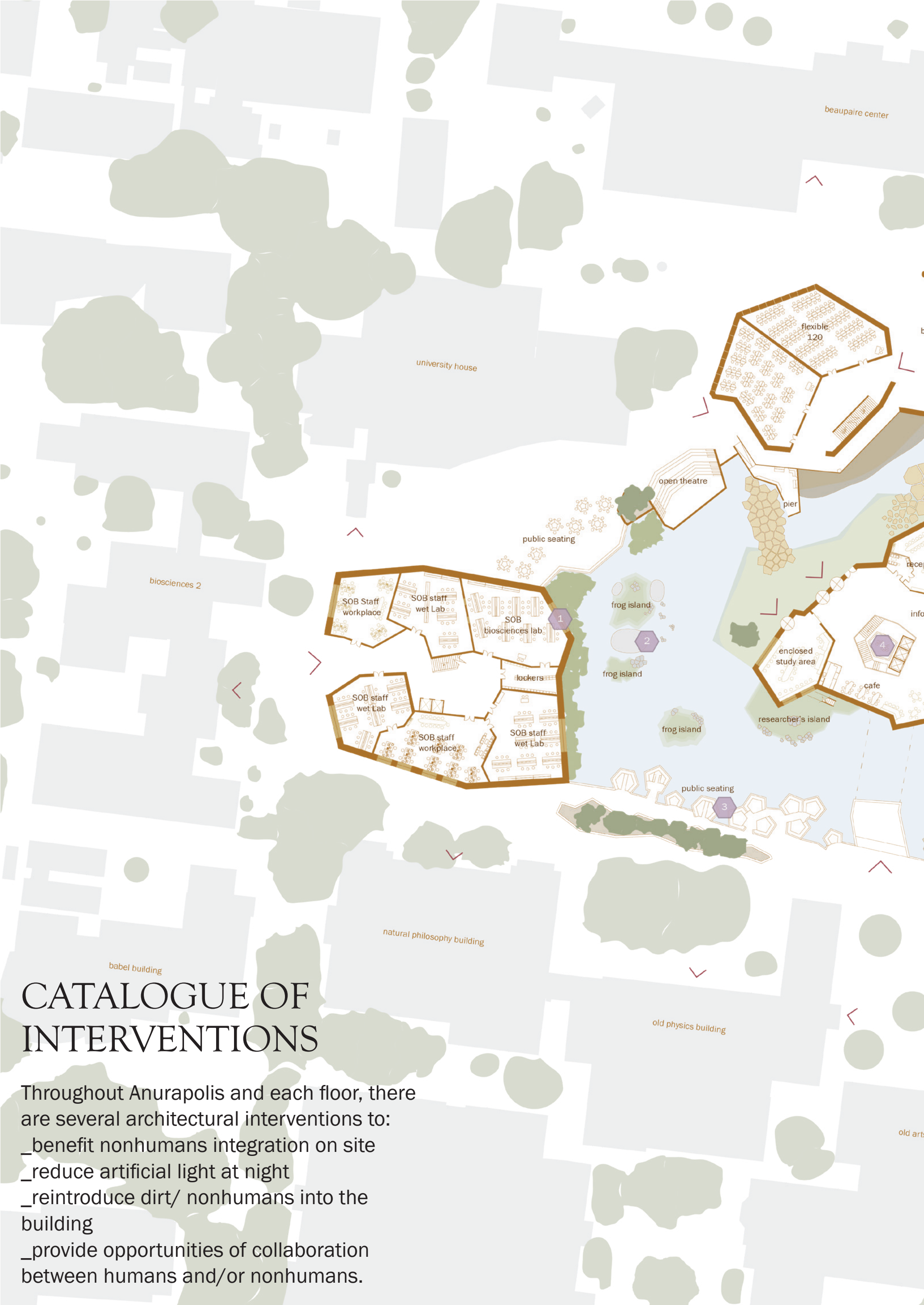


For the Students

Apart from visual or curriculum exposure to the research facilities, programs are scattered around the site especially to allow first year students an opportunity to get to know the buildings better. An informal common room at the top will be a place for first years to gather in between classes or to study. Below is a quiet room designated for studying only as plenty of science students are hardworking and deserve their own area of study instead of looking for places at other faculties.

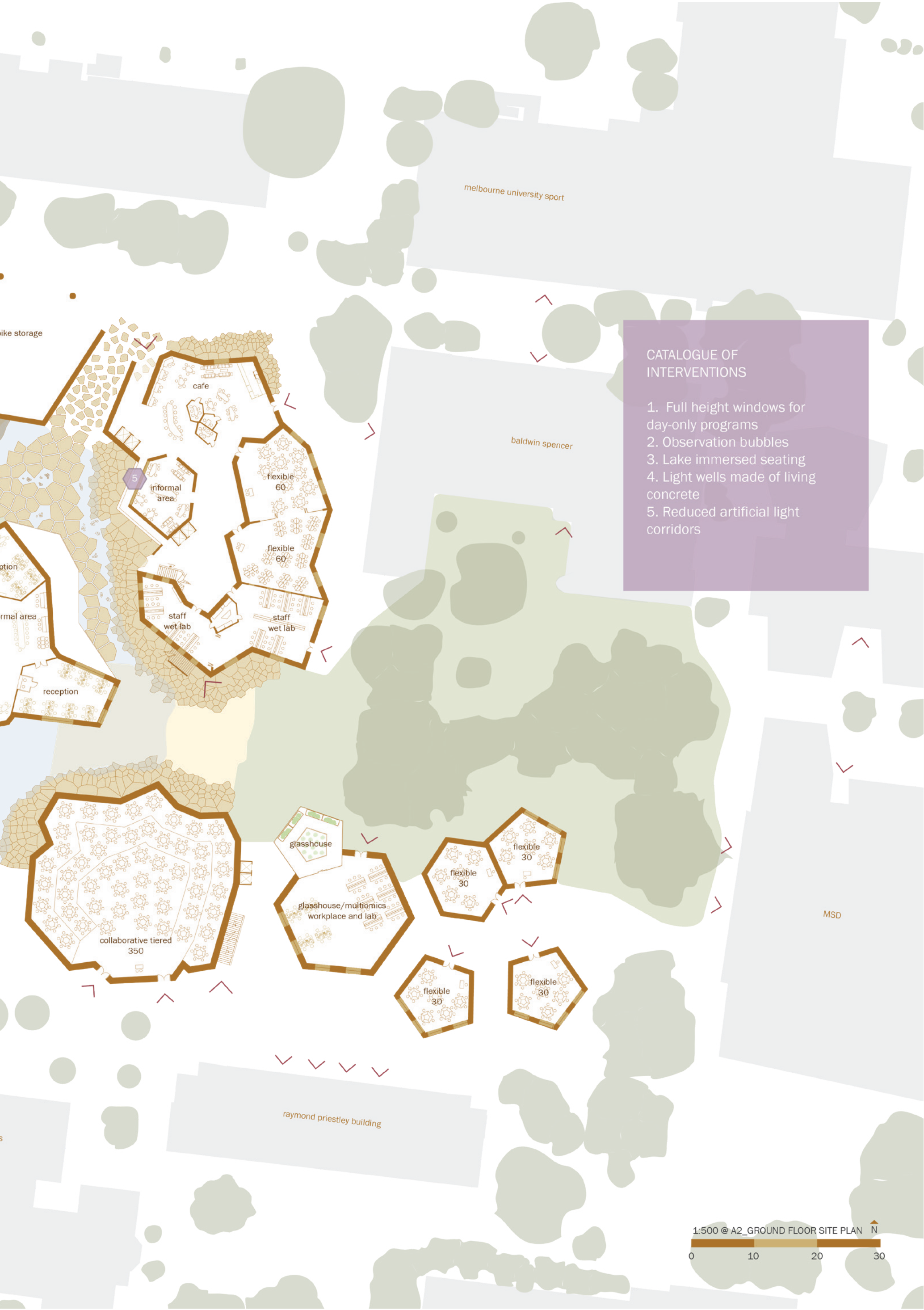


1:150 @ A2_EAST BUILDING SECTION A-A



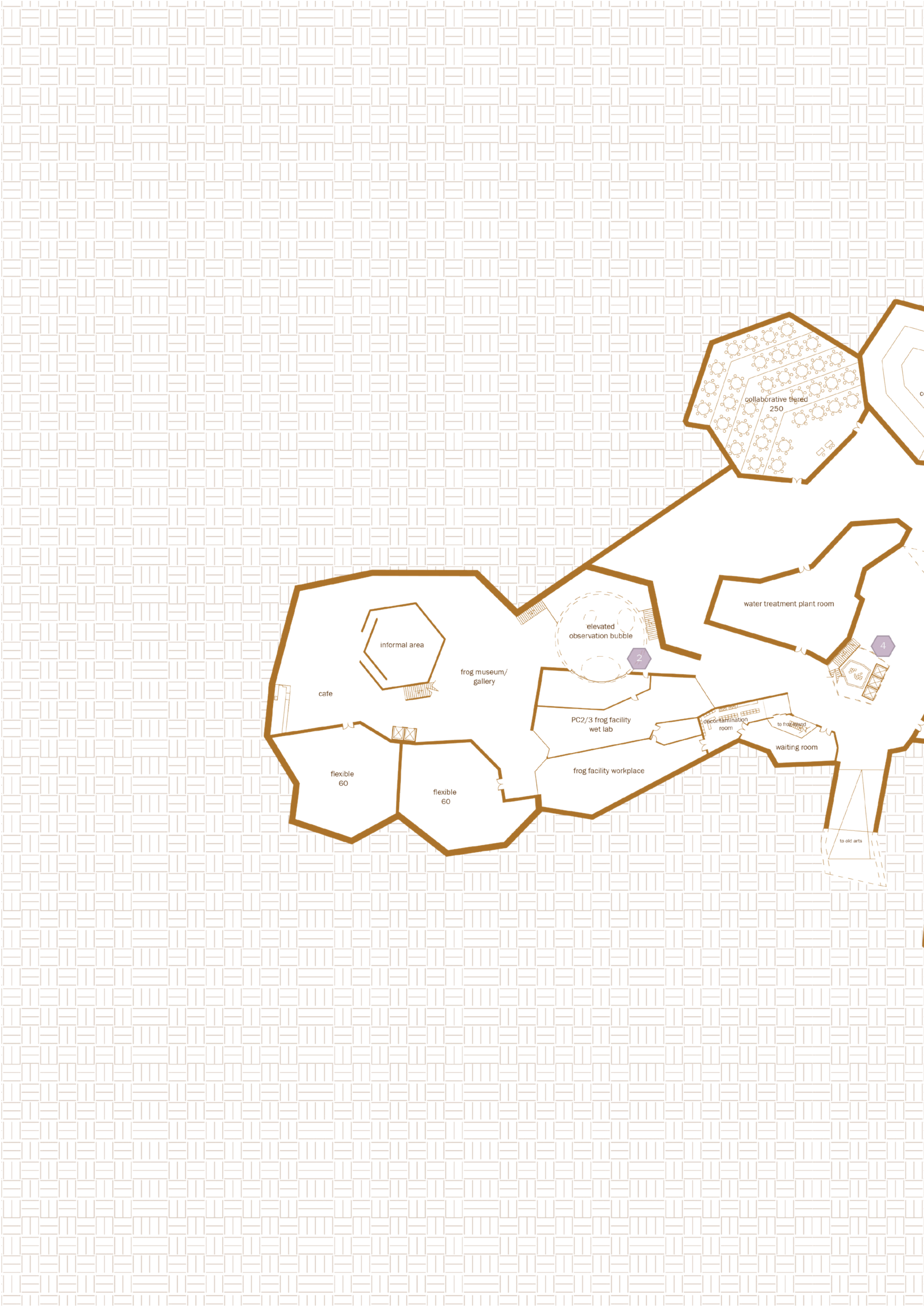
CATALOGUE OF INTERVENTIONS

Throughout Anurapolis and each floor, there are several architectural interventions to:
_benefit nonhumans integration on site
_reduce artificial light at night
_reintroduce dirt/ nonhumans into the building
_provide opportunities of collaboration between humans and/or nonhumans.



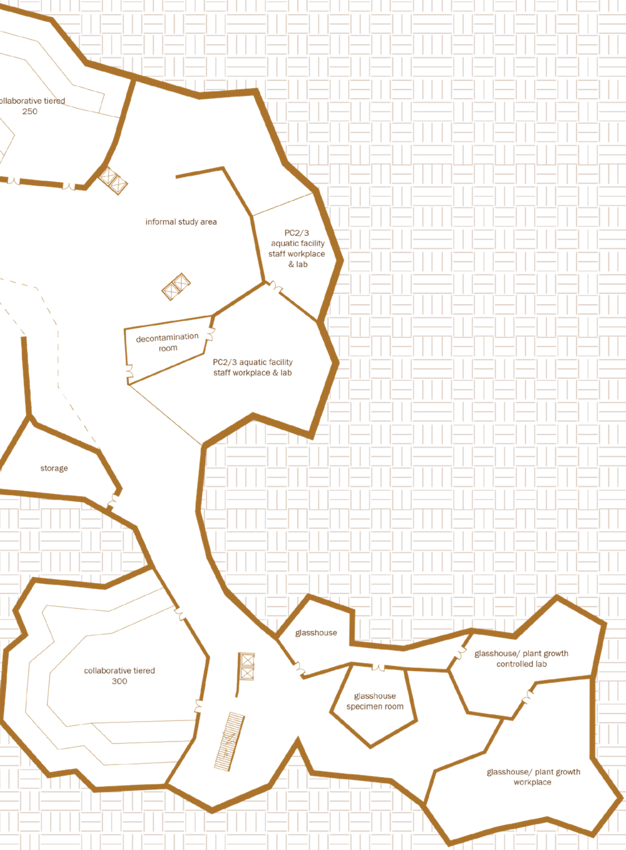
CATALOGUE OF INTERVENTIONS

1. Full height windows for day-only programs
2. Observation bubbles
3. Lake immersed seating
4. Light wells made of living concrete
5. Reduced artificial light corridors

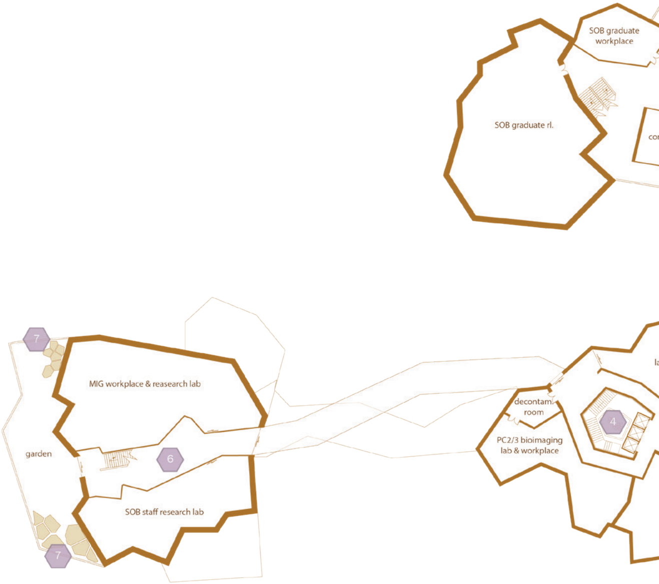

collaborative tiered
250
water treatment plant room
elevated
observation bubble
2
4
informal area
frog museum/
gallery
cafe
PC2/3 frog facility
wet lab
decontamination
room
to frog island
waiting room
frog facility workplace
flexible
60
flexible
60
to old arts

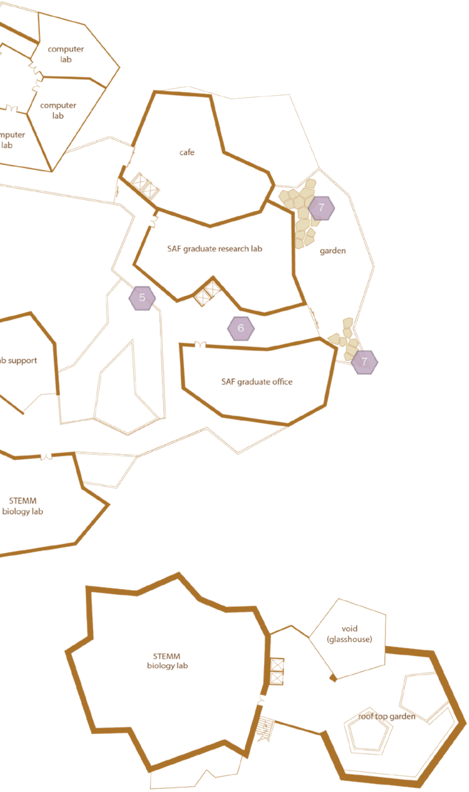
CATALOGUE OF INTERVENTIONS

2. Observation bubbles
4. Light wells made of living concrete



1:500 @ A2_BASEMENT FLOOR PLAN


SOB graduate workplace
SOB graduate rl.
7
MIG workplace & reasearch lab
garden
6
SOB staff research lab
7
decontam. room
4
PC2/3 bioimaging lab & workplace

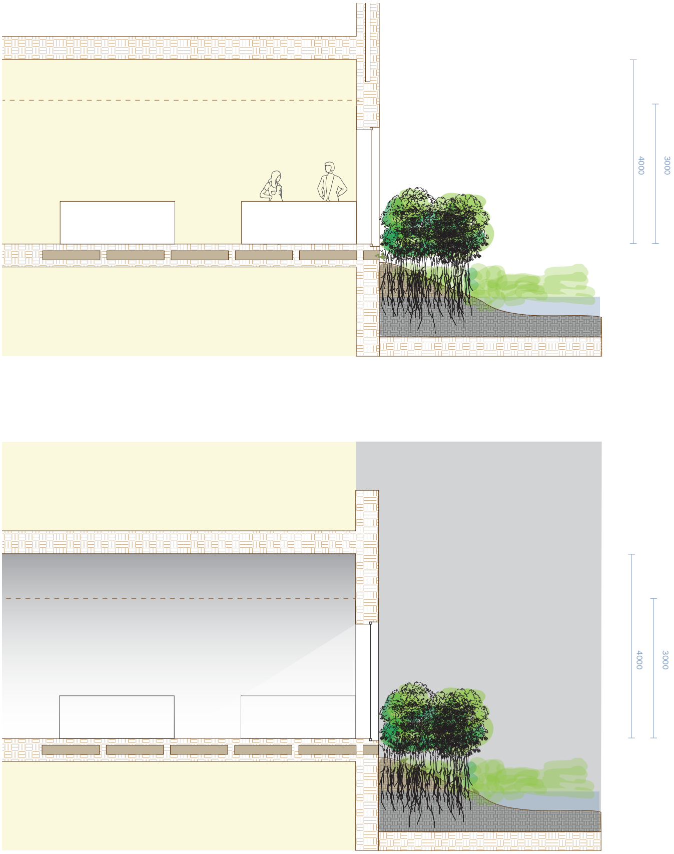


CATALOGUE OF INTERVENTIONS

4. Light wells made of living concrete
5. Reduced artificial light corridors
6. Collaboration corridors
7. Valleys

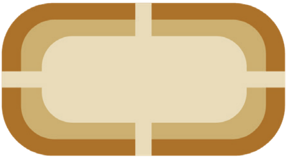
1:500 @ A2_4TH FLOOR PLAN

1



1:100 @ A4 Reduced artificial light corridors

m 0 1 2 3 4 5

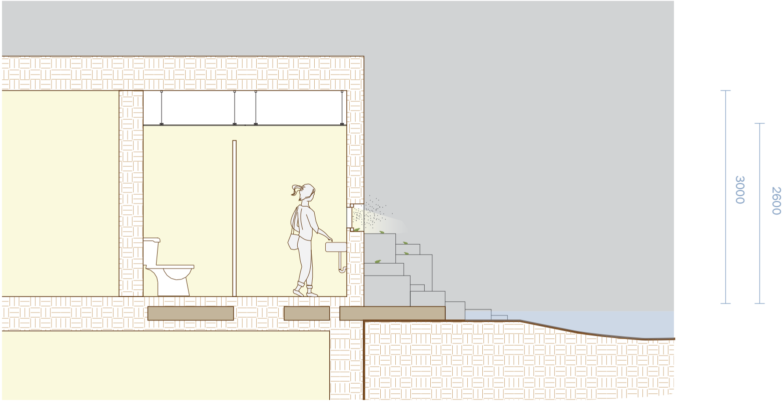


layers of darkness

Different Program, Different Window

Based on the concept of 'Layers of Darkness' student laboratories that are not used after hours, are able to have full height windows to maximise the views over the water and mangroves as their lights would be off at night.

1



1:100 @ A4 Reduced artificial light corridors

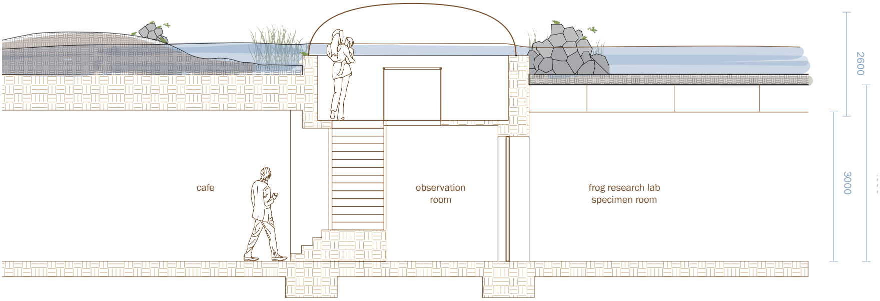
m 0 1 2 3 4 5

Fig. 13. A frog's night out
As a human uses the bathroom, Alex sits on the window ledge waiting for her dinner.

Different Program, Different Window

On the other hand, some night light is necessary for frogs to go hunting at night. Frogs have adapted to use night lights to easily hunt for insects as they are easily attracted to the light.

Consequentially, being around a night light would make the frog easier for predators to see, however in Australia there aren't that many predators except for cats or large hunting birds which are not too common around the university.



1:100 @ A4

Observation Bubble

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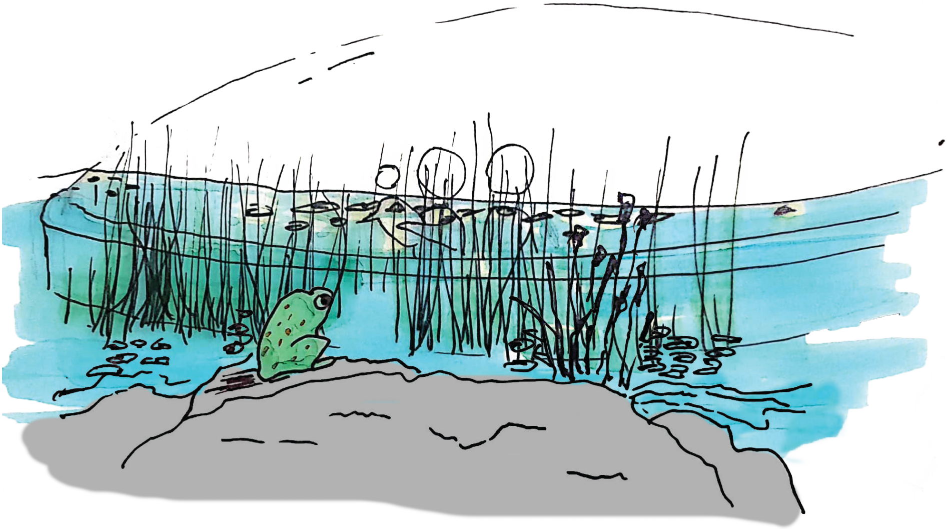


Fig. 14. Observing humans
Kimi pretends not to see a couple of humans with a baby looking at him.

Observation Bubble

Open to the public, and located in the basement of the site, the observation bubble is connected to the Frog Research Facility's specimen room, where sometimes Frog specific tours happen.

The observation bubble room has an elevated plaform with a shallow glass dome that brings the human users at eye level with the surface of the lake. Tall reeds slightly obscure the view of the dome to the frogs to allow undisturbed observation of their activities.

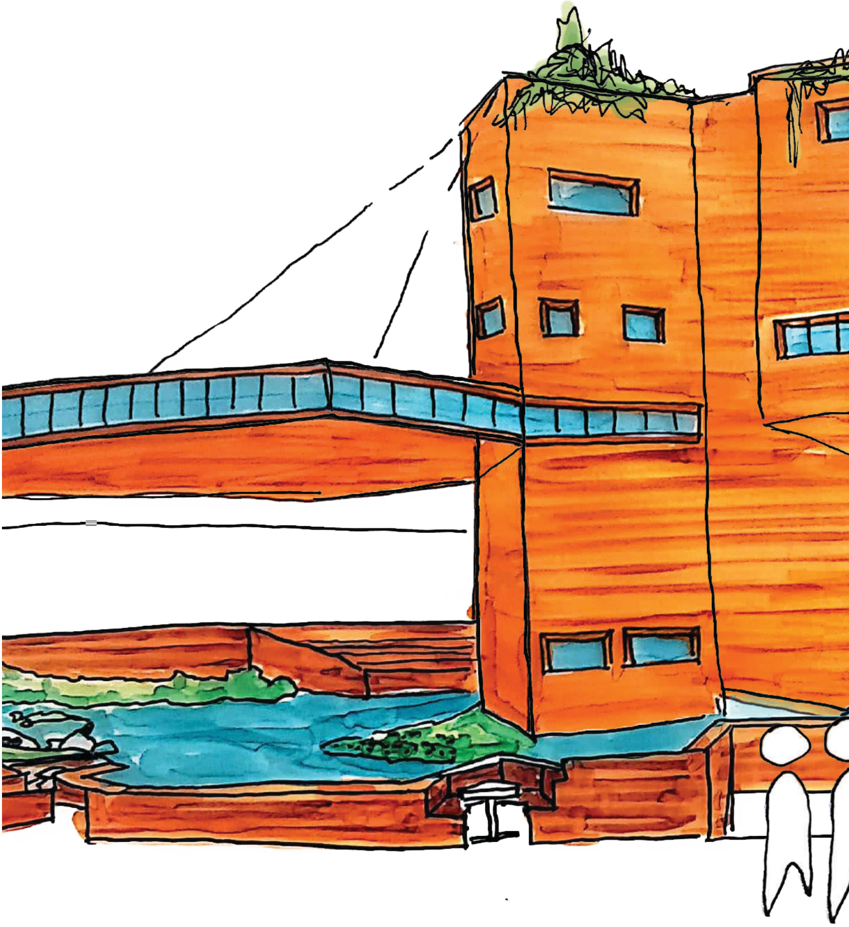
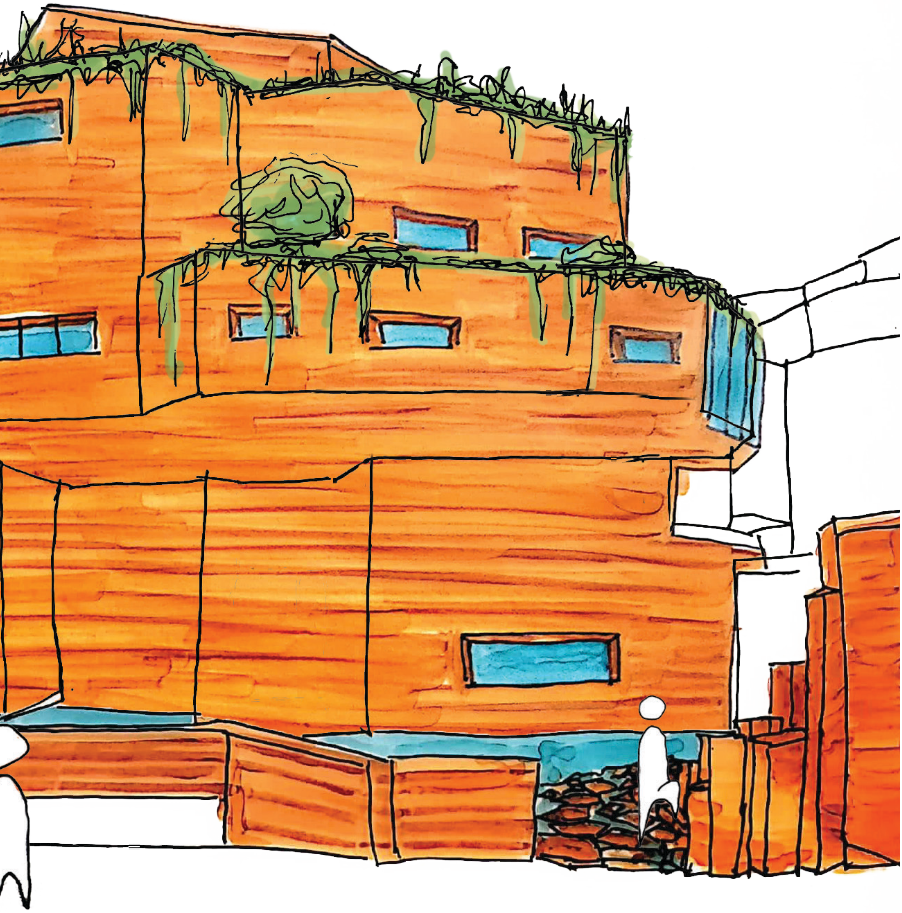
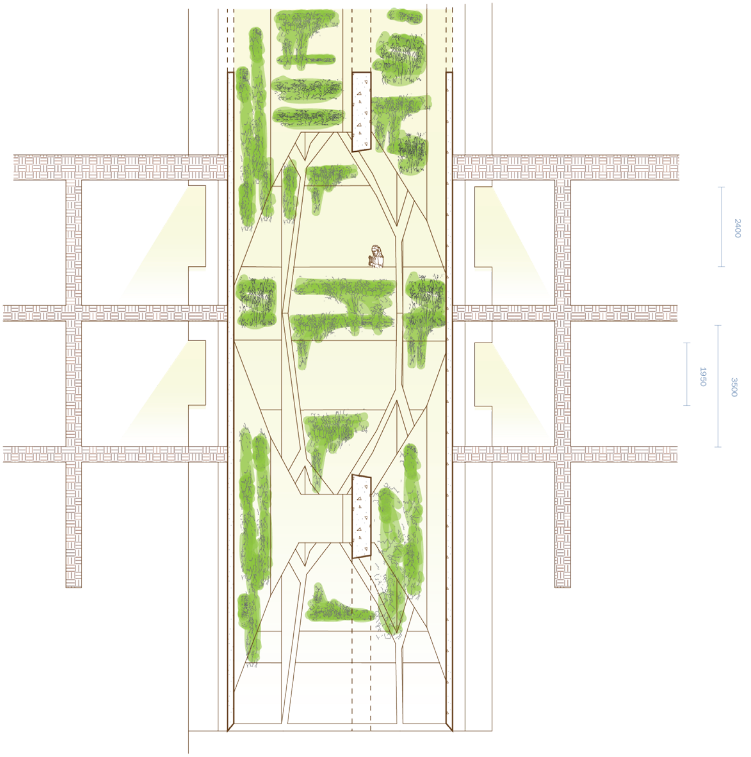


Fig. 15.1. Entrance to the basement with seatings on the left



Lake Immersion

Around the lake are urban rooms for the public to sit and take in the view, in particular the set of public seatings situated to the left of the basement entrance.
These cubicles within the lake give the occupants the unique experience of being immersed. The wind off the water during the summer will cool the air around and provide a nice atmosphere to relax in.



1:150 @ A4 Living concrete atrium

Fig. 16.1. Living concrete taking over.

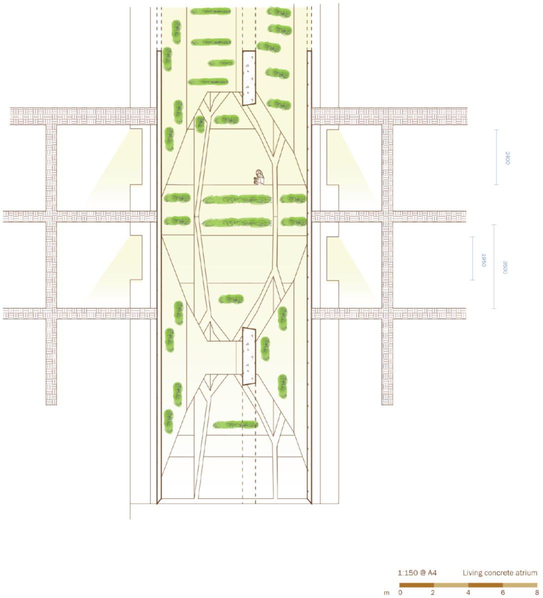
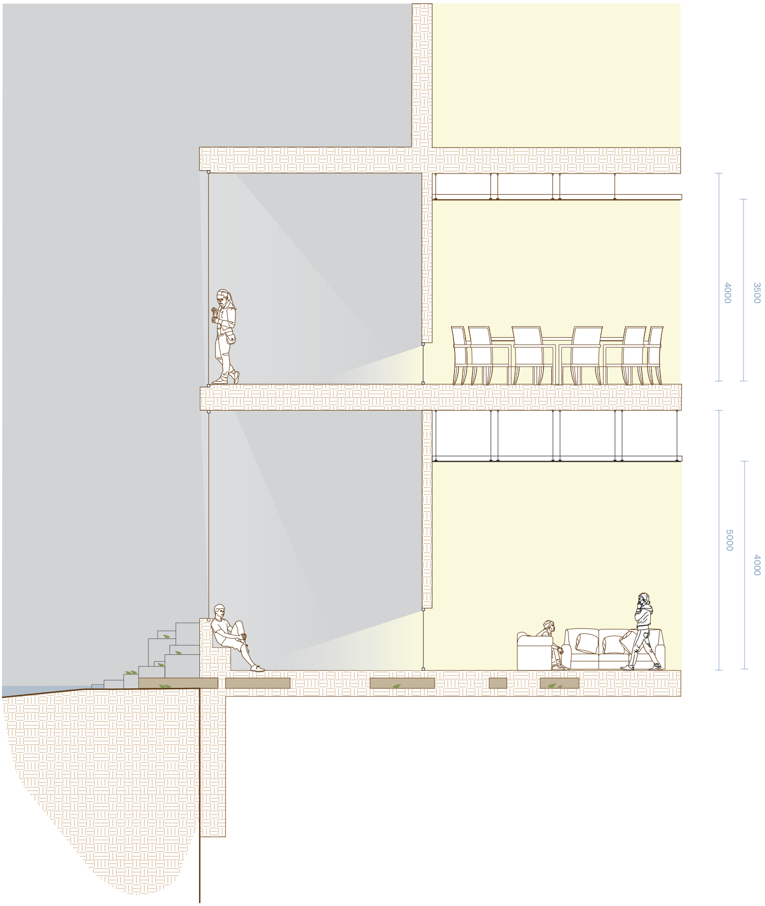


Fig. 16.2. Living concrete when first planted.

Light Wells with Living Concrete

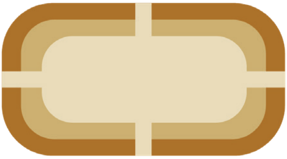
Living concrete is more porous than normal concrete and allows plants and vegetation to spread and grow over time so it begins to take over the interior, re-introducing alternate life, dirt and nature back into the building.

Then in a bid to reduce the impact of artificial light on nocturnal wildlife, light wells are introduced to lessen its intensity and impact than if the building was made of glass curtain walls.



1:100 @ A4 Reduced artificial light corridors

m 0 1 2 3 4 5



layers of darkness

Reduced Artificial Light (RAL) Corridors

Also based on the concept of 'Layers of Darkness' corridors facing the lake deliberately do not have lights above. This is a feature to minimize the impact of artificial light on the nocturnal nonhuman life. In the day, the corridor is brightly lit, even on a cloudy day, for people to travel through easily. And at night, the reflected light from adjacent rooms will light up the floor. Alternatively, there are brightly lit internal corridors for those afraid of the dark.

6

“Architecture can’t force people to connect. It can only plan the crossing points, remove barriers, and make the meeting places useful and attractive.”

– Denise Scott Brown[1]

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1. Denise Scott Brown
2. Sandra Kaji-O’Grady and Chris L. Smith, “Laboratory Architecture and the Deep Membrane of Science,” in Industries of Architecture, ed. Katie Lloyd Thomas, Tilo Amhoff, and Nick Beech (London: Routledge, 2016), 282–93.

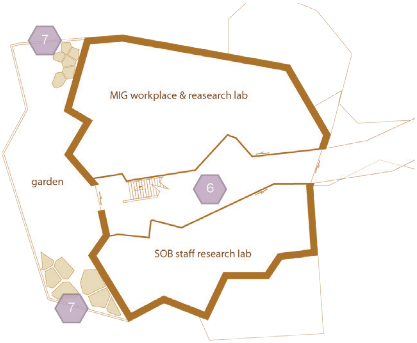


Fig. 17.1. *Collaboration corridor in the East building.*

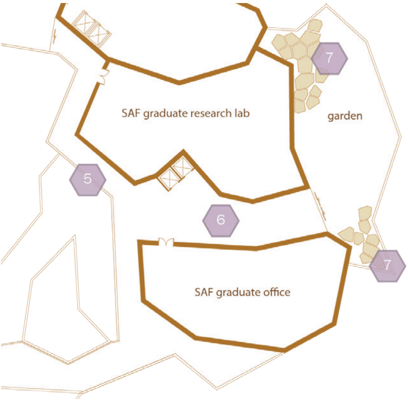


Fig. 17.2. *Collaboration corridor in the West building.*

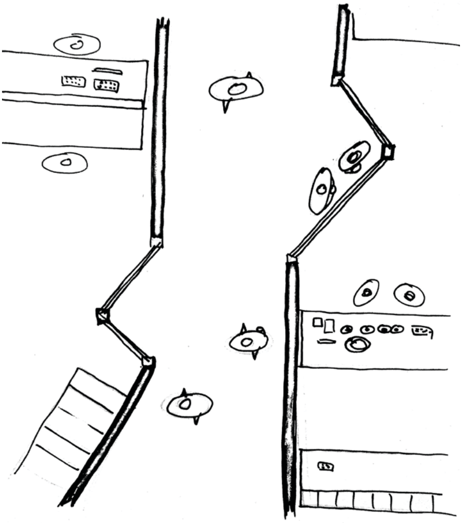


Fig. 17.3. Nicole Ren, *Dented circulation that dips into research labs*, 2020.

Collaboration Corridors

Another key aspiration for the building was to create the opportunity for collaboration across research groups, faculties or sciences. As Kaji O'Grady describes "that buildings might serve to increase socialisation between scientists and thus, quicken the process of discovery."[2], circulation paths become the first response, where corridors are justified as allowing 'bumping' into other researchers as a way to invite more collaboration. This belief is overly optimistic and socially dependent on the human users. It does not invoke innovative design to enhance these possibilities.

Instead the circulation path is designed with dents and pseudo-immersion that dip passerbys into the research labs. It allows for pause and speculation, and for researchers (or students) to comfortably stop and chat in the middle of a main circulation route (Figure 17.3), whilst in view of ongoing experimentations that hopefully spark fruitful conversations.

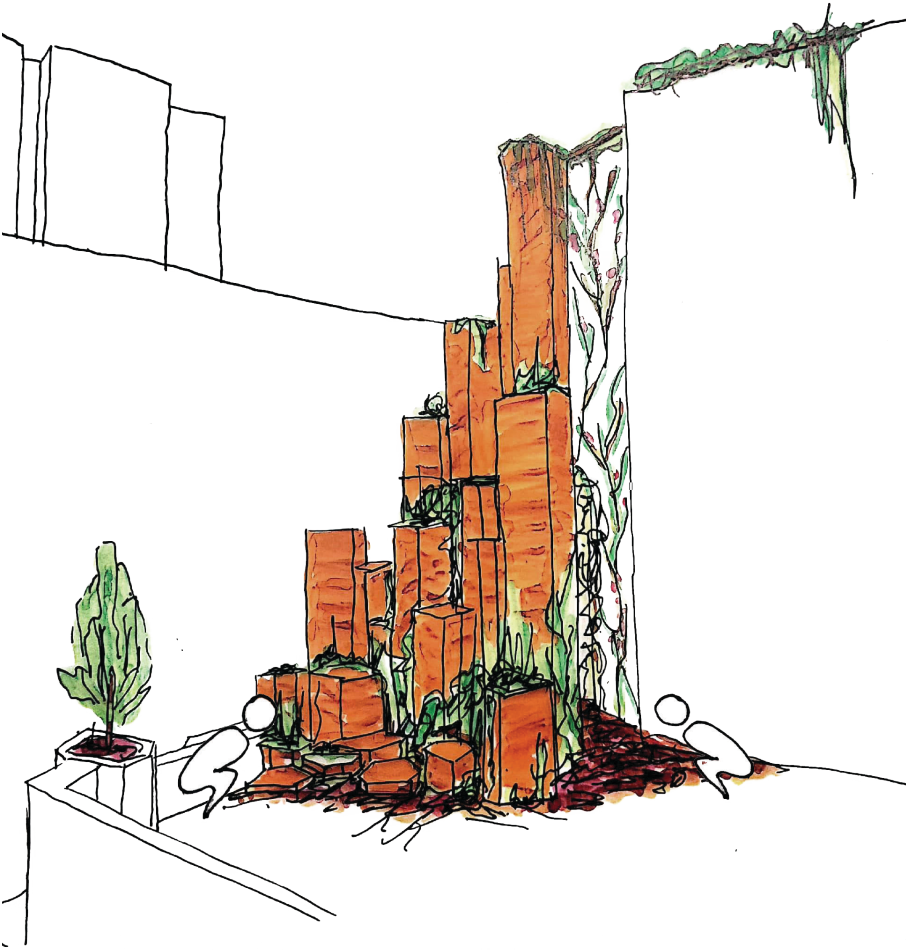


Fig. 18.1. *A Valley cluster*

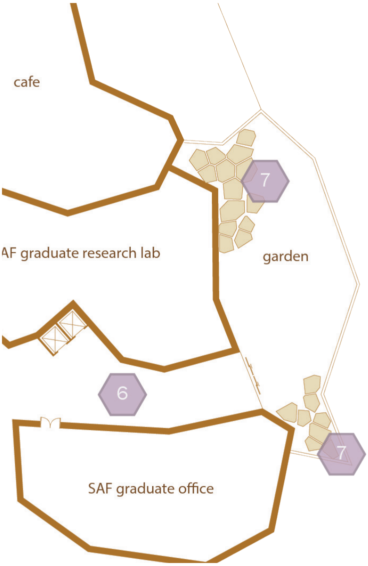


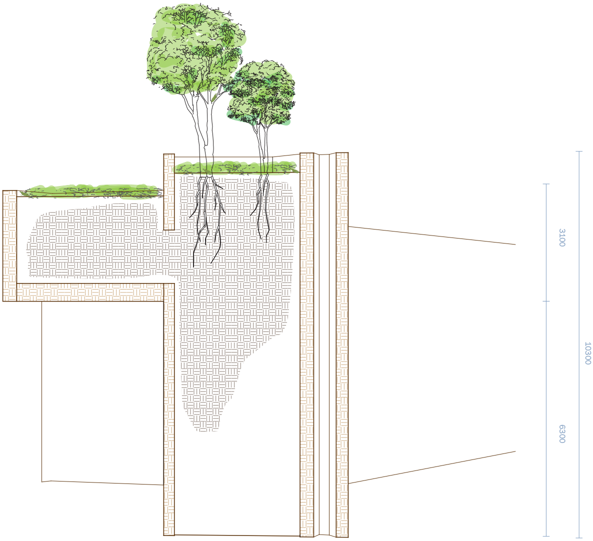
Fig. 18.2. *A Valley cluster locations on the 4th floor of the East building.*

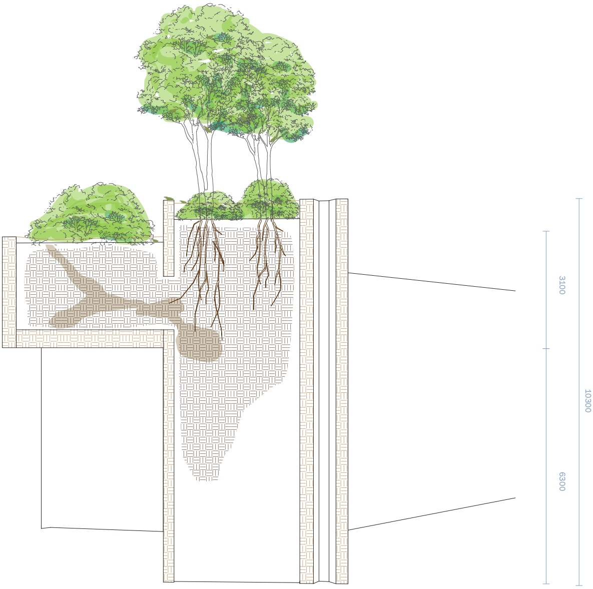
The Valleys_Clusters

Anurapolis aims to provide students with a living laboratory, full of uncontrolled nonhuman lifeforms and self-sustaining ecosystems to observe and study such as the Valleys.

A few Valleys are located at each building, where a collection of voronoid column clusters allows dirt, leaves, soil, and nonhumans to collect undisturbed to live on the building's facade

The Valleys were created as architectural cracks and crevices on the building's façade to allow nonhumans and nature their own space in the urban environment. It is a way to slowly introduce dirt and life into the building. The rammed earth's finished matte and rough surface also provides a natural scaling wall for nonhuman to travel between floors and the Valleys.





1:125 @ A4 Tree planters

m 0 1 2 3 4 5

The Valleys_Tree Planters

Tree-sized planters also form a part of the valley, where tall columns of fresh soil form a livable facade for nonhumans to burrow themselves into to create their own homes.

The openings between each column allows nonhumans to expand past the boundaries of the original planter and potentially create a labyrinth within the facade.

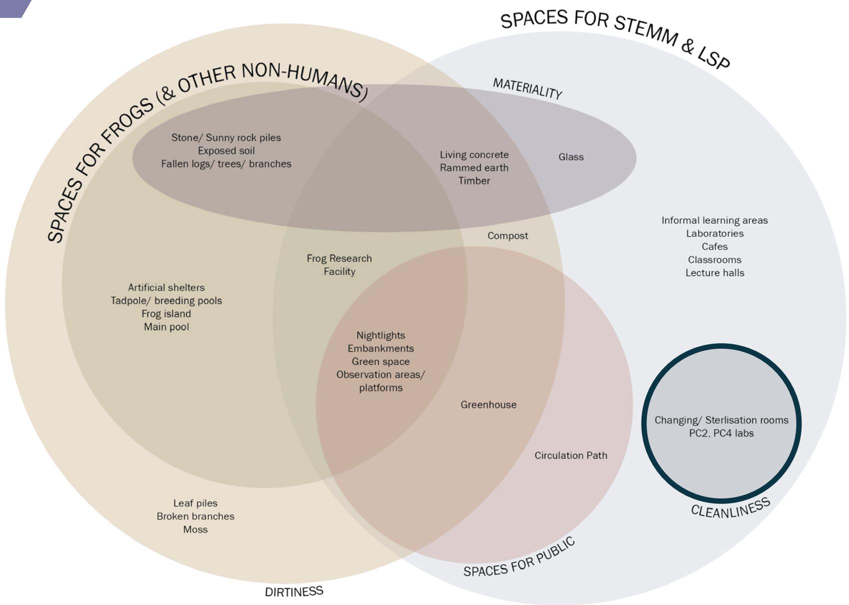


Fig. 19.1. Nicole Ren, *Required cleanliness in LSP*, 2020.

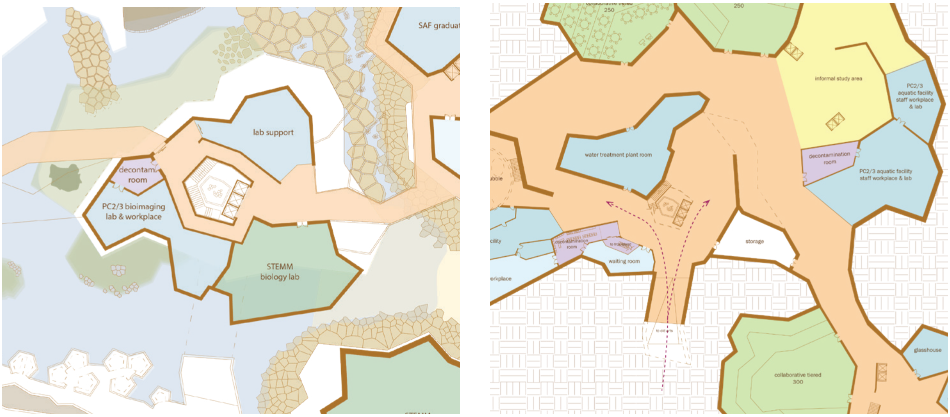


Fig. 19.2. Nicole Ren, *Decontamination rooms precede PC2/3 Labs*, 2020.

Decontamination Room

As almost all the spaces can be classified as ‘dirt’, the category for cleanliness only contains PC2 - PC4 laboratories which involves sensitive experiments that require fully sealed environments (Figure 19.1). The spaces that do not belong to either category exist between the two extremes suggested.

Kaji O’Grady alludes to the laboratory and its perimeter as a biological membrane that is susceptible to transmissions and potential contaminations[1]. A series of suggestions including airlocks, barrier seals, and observation windows are active solutions to protect the sensitive environment of PC2-4 laboratories.

This necessity for a completely clean environment led to the addition of a transition decontamination zone, where researchers change into their lab clothes and clean shoes before entering the sealed space (Figure 19.2). Within this space are a sequence of lockers and sanitation sinks that researchers pass as they enter their office.

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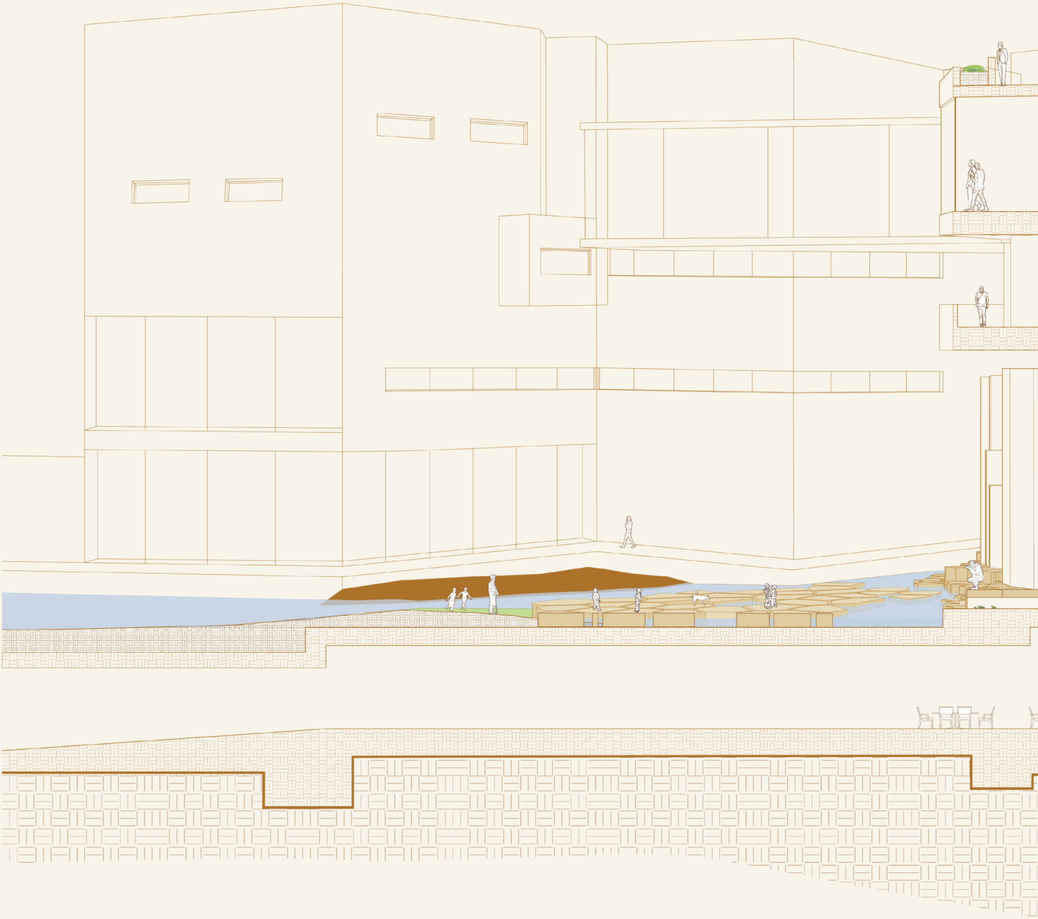
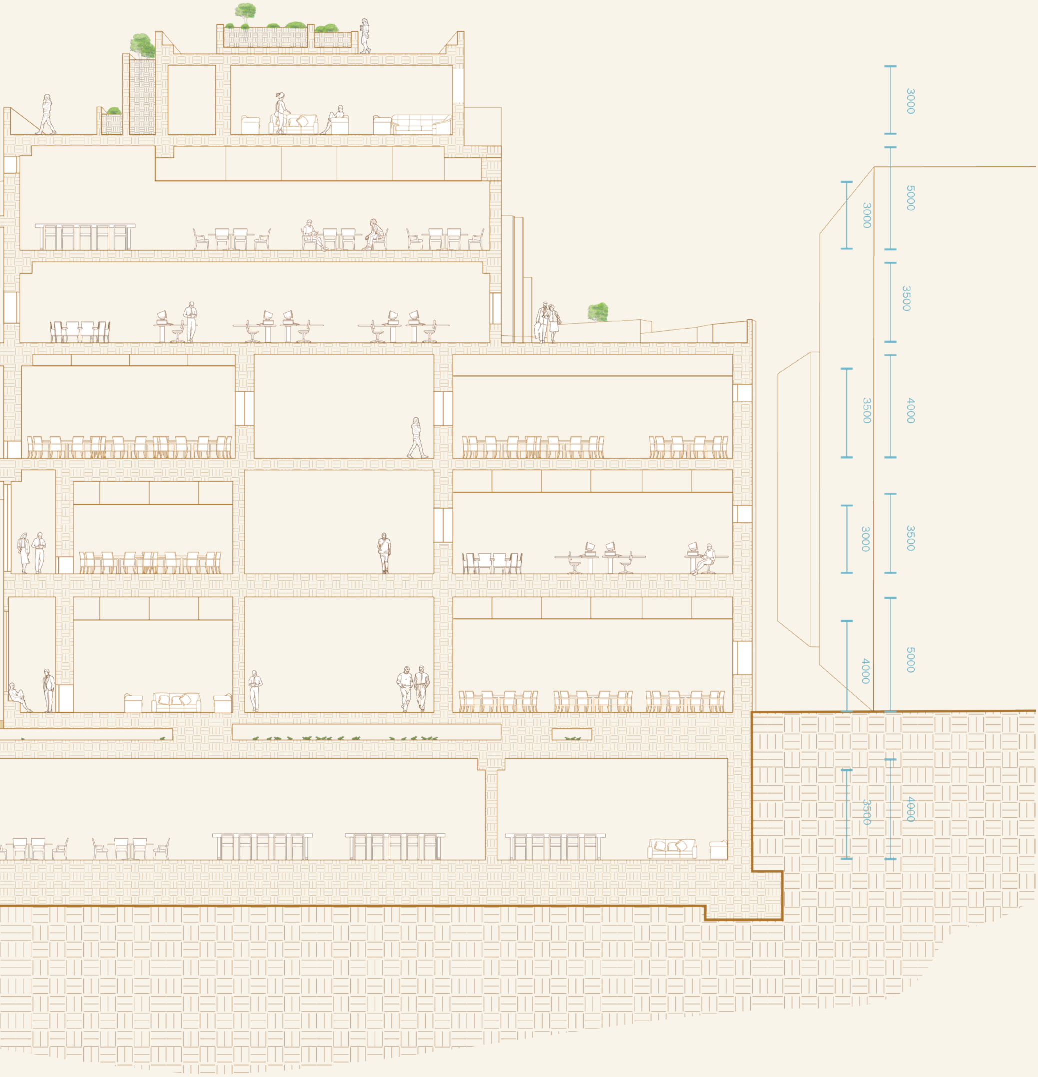
1. Sandra Kaji-O’Grady and Chris L. Smith, “Laboratory Architecture and the Deep Membrane of Science,” in Industries of Architecture, ed. Katie Lloyd Thomas, Tilo Amhoff, and Nick Beech (London: Routledge, 2016), 282–93.

If you step back from Anurapolis, you will see it begins as large clusters of voronoid rooms like the Valleys, that seemingly crumble into the wetlands and moat surrounding it, creating small stepping stones and piles of rocks for children to climb or frogs to sunbathe.

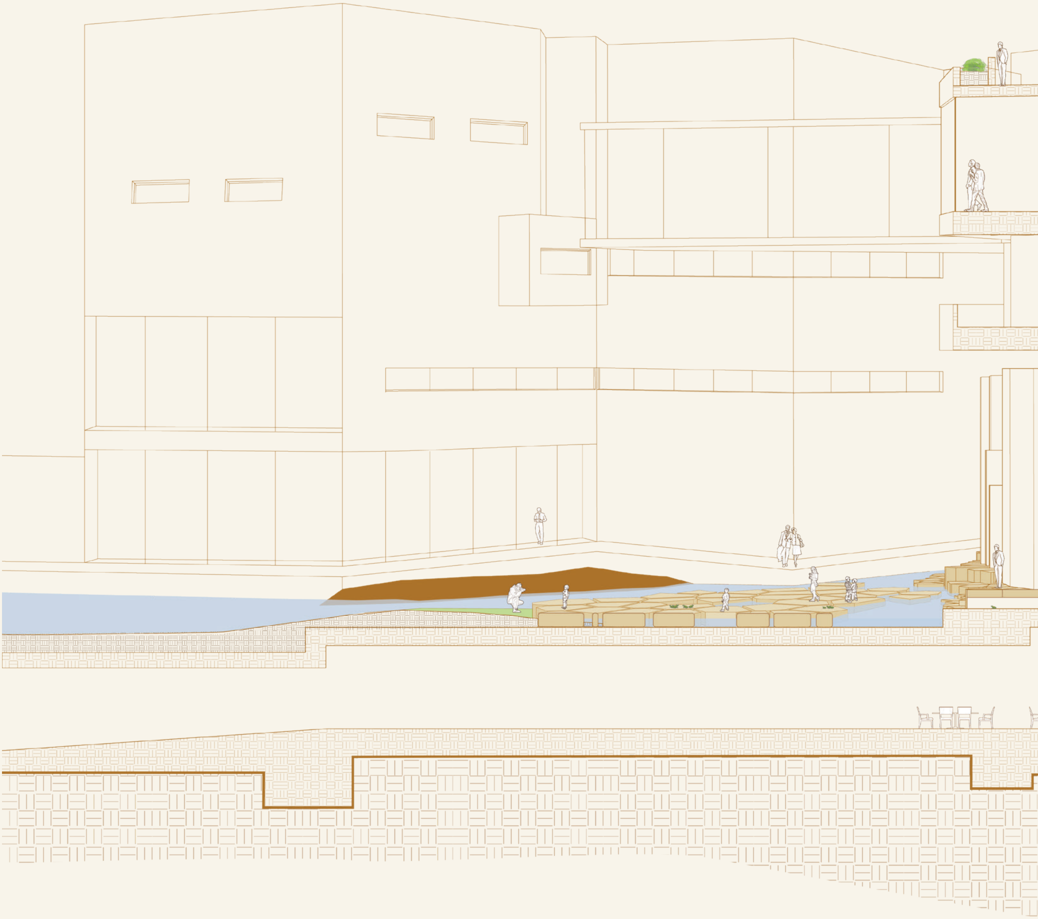
As the years pass, the angular irregular structure allows time and nature greater impact.

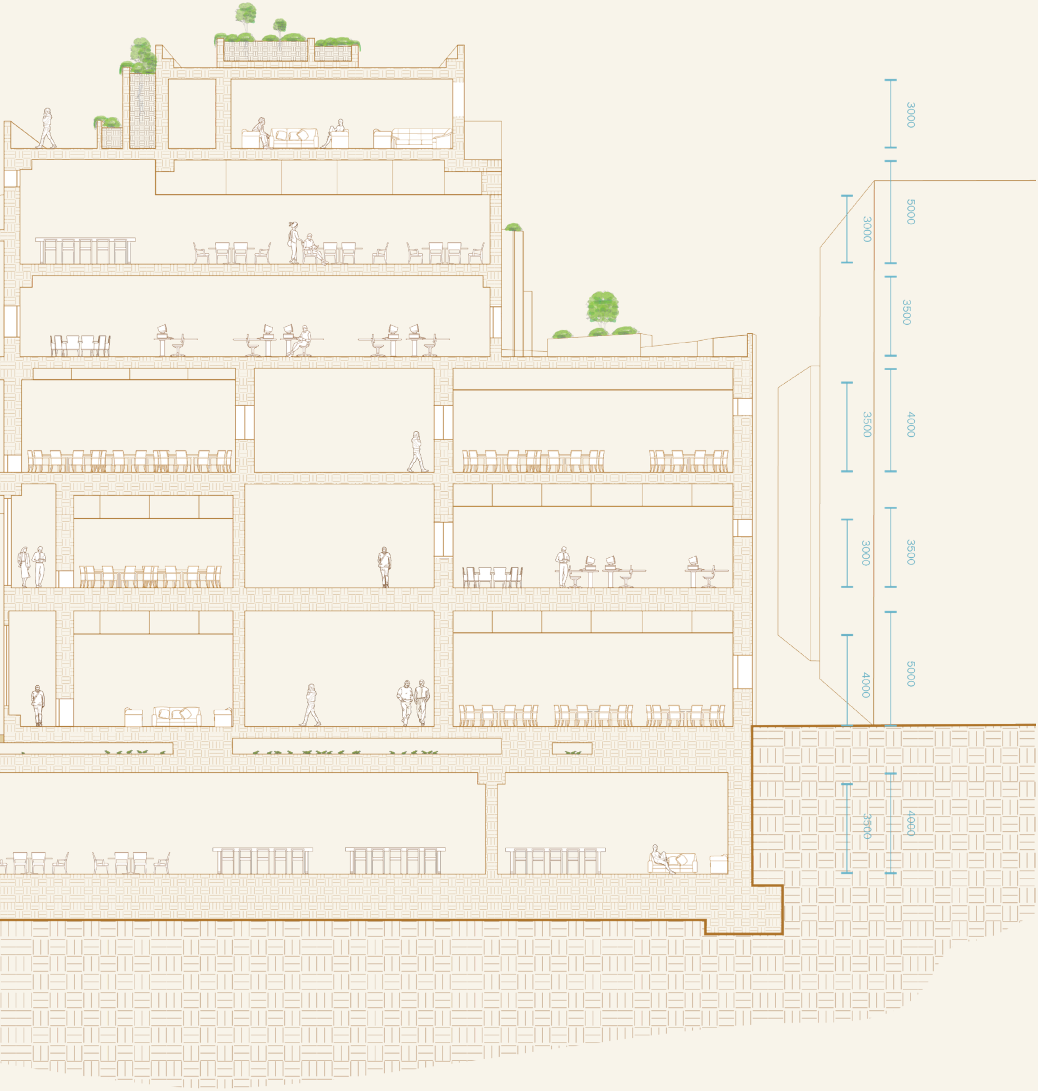




1:150 @ A2_EAST BUILDING SECTION A-A

Meaning that the water will gradually erode the sharpness of the rocks, the slope of the banks,

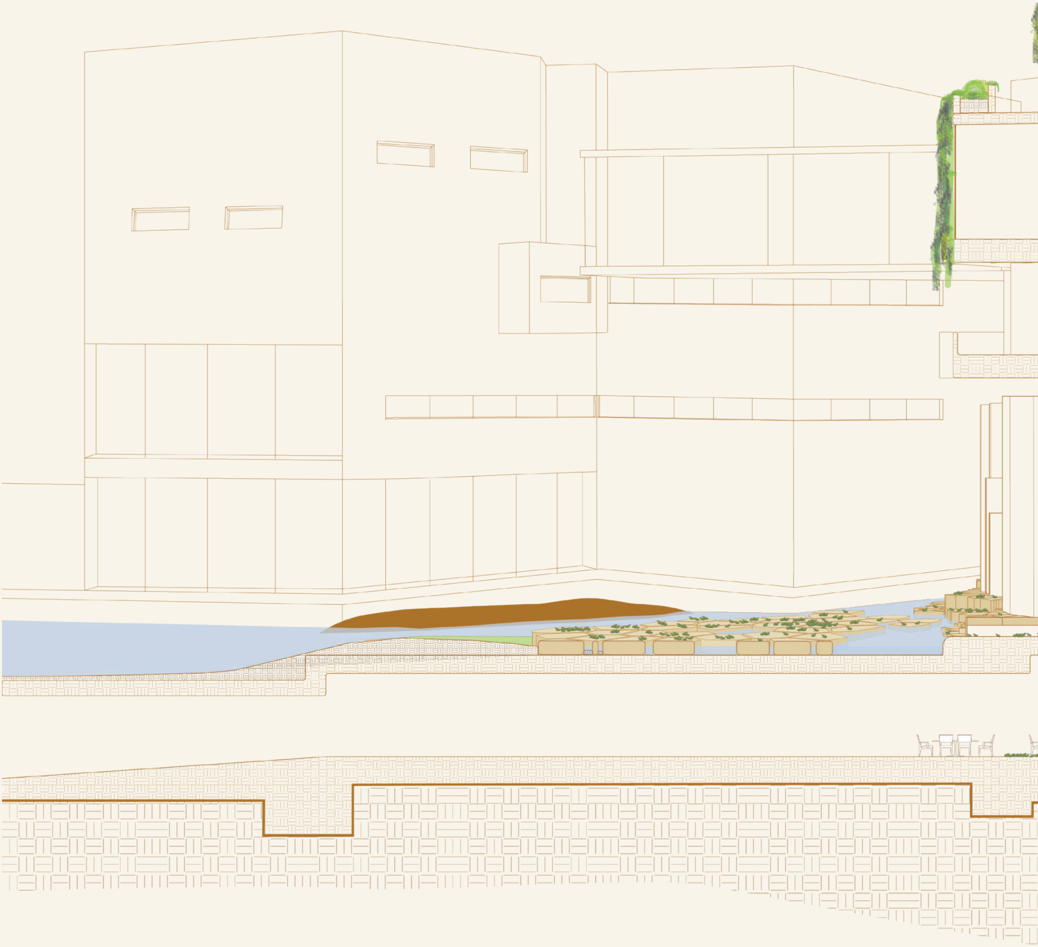


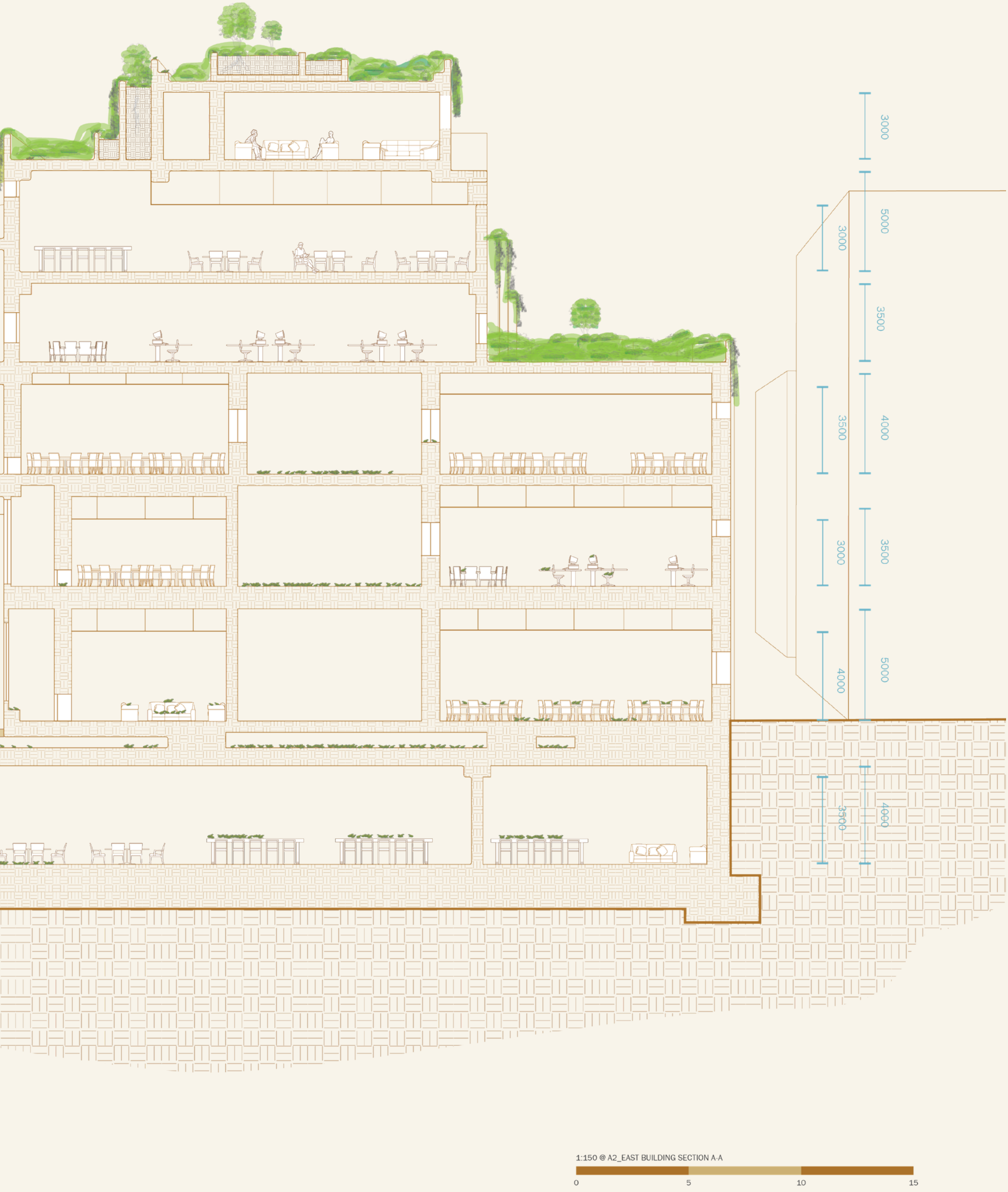


1:150 @ A2_EAST BUILDING SECTION A-A

0 5 10 15

and the vegetations will grow and tumble to smoothen the extruded exteriors, to eventually meet the water at its edge.





1:150 @ A2_EAST BUILDING SECTION A-A

“How can
reconstructing
the pre-existing
biome of the urban
environment
teach us about
the interspecies
potential before
human intervention
and environmental
degradation? ”

– Thesis Question

07 CONTRIBUTION TO KNOWLEDGE

With the current daily life and human expectations of a building being completely separated from the elements and extinguished of any nonhuman presence, it is an unsustainable lifestyle that seeks to be rectified.

This thesis explored architectural experimentation with natural ecologies that encourages novel urban environments that are welcoming to pre-human ecosystem members by first re-constructing a large waterbody and locating a global frog research facility on site to record the outcomes of this experimentation. The lake provides a clean fresh water source and maximises the opportunities for nonhuman life to thrive in densely populated urban environments, especially for water dependent lifeforms like the frogs.

Various methods like the observation bubble, the valleys, and the shared edges of the lake encourages the inclusion of more-than-human communities and allows moments for human-nonhuman interactions. This sharing of the site and programs with nonhumans, will also ultimately promote the human users to think more eco-centrically and empathetically towards them. Whilst interrupted corridors design conversation opportunities for human users to hopefully lead towards collaborations.

Additionally, by considering the active hours of different users, weather and important months of the year (e.g. breeding season) the architectural interventions also benefit the lives of nonhumans by returning back the site after hours, and preventing human access to particular areas during certain times. Their overall quality of life is also improved, with RAL corridors and light wells minimizing the negative glare of artificial light, and still accomodating the frogs' use of nightlights as a hunting ground.

Materials like rammed earth and living concrete also aid in this process of reintroducing nonhumans and dirt back into our lives. Scalable walls, large tree-planters, and internal vegetation provides homes for alternate life to claim "unused" surfaces on the exterior and interior of the building.

Anurapolis, a living wetland laboratory, has shown that by designing for nonhumans through reconstructing the natural biome and terrain of the environment, novel and innovative architectural interventions can be achieved to reintroduce dirt and nonhumans back into our lives and allow them to flourish on their own.

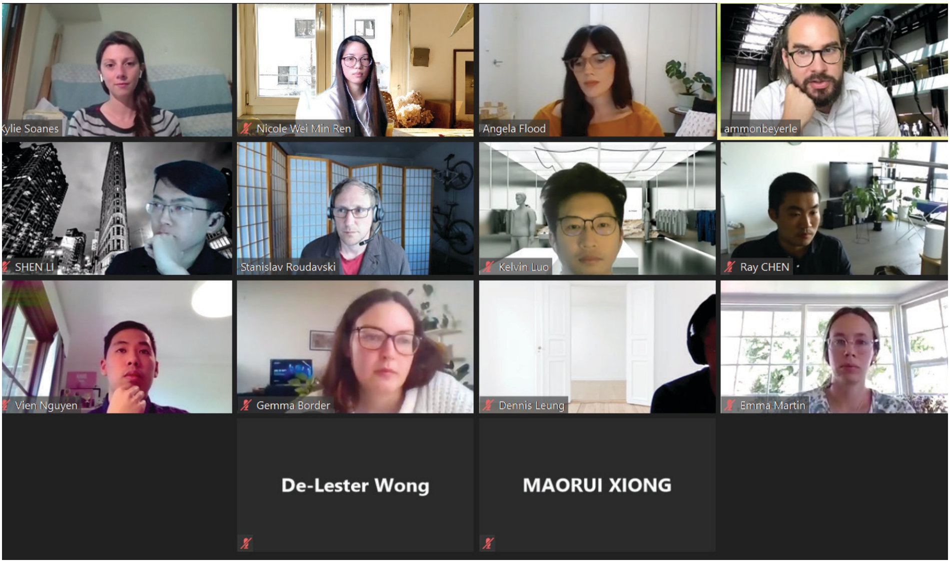


Fig. 20 .Nicole Ren, *Final Crit Class + Crit (+ my friend Lester) photo*, 2020.

After experiencing yet another unique semester amid a pandemic and lockdown, I am quite proud of what I have achieved. It has been an interesting semester designing for another unconventional studio. I personally found it quite challenging trying to design for a nonhuman client for the first time and a building at a scale I have never done before.

The first months were a confusing information packed blur, flipping back and forth between learning about nonhumans, ecology and research labs. Admittedly, the composition and larger scale architectural flow could have been better resolved, but with trying to straddle what seemed like landscape architecture/architecture and the sheer scope of the brief it was unfortunately compromised for the ideas and resolution at the smaller scale. Although, I do feel that whilst the project is packed with ideas, I might have been over ambitious with trying to include them all, and it meant they were not entirely resolved. Still, there is so much potential to develop more ideas.

I always thought that my project was about the subtle architectural interventions that would benefit my primary clients, the frogs, and so my focus was always drawn to the smaller scale and on carving ways to alter contemporary built forms to suit their purpose. Things that could be developed:

_bring themes deeper into the overall architecture and narrative. How does dirt and cleanliness work? Does someone go in ‘clean’ and exit ‘dirty’? How do people discover dirt and change their perception?

_the brief, ideas, and narrative are very evocative, and the images and drawings can be further developed to match it

_more cohesive architecture throughout the buildings and to begin to spread the moments of intervention across the campus

_fully resolve the structural system

_bringing the lake or water into/ up the building, to make it omnipotent on site

Overall, I'm glad I got to experience this studio. I think I have pushed myself to do as best as I can, and it has undoubtedly been fun and eye-opening to go through. The many (so many) readings and different nonhuman clients explored by my studio mates has changed my perception about the scope of architecture and a building not being the be-all-end-all of the natural landscape or the homes of nonhumans. I have learnt how it can continue to be a part of the nonhuman world and impact their lives despite the current global urbanization trend.

Thank you again, Stanislav for all your time and effort this final semester. I truly appreciate it, and hope more tutors can be half as invested as you are with our projects.

AUTHOR'S THOUGHTS

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